NOVEMBER 10, 1997 VOLUME 14, NUMBER 45

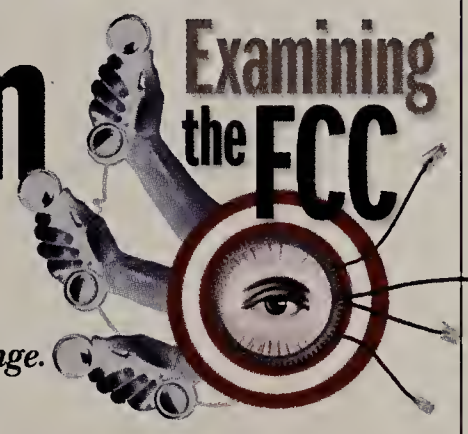
NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

Bay Networks enjoys good House-keeping

CEO David House gets stamp of approval for first year on the job. Page 6.

FCC stumbles on road to reform



Caught between Congress and intransigent carriers, the FCC hasn't kicked competition into gear. This three-part series examines why it's failing and offers a recipe for change.

By Susan Breidenbach

When the Telecommunications Act of 1996 was enacted on Feb. 8 last year, the Federal Communications Commission was charged with ushering in a new era of market-driven competition. But the FCC's resulting regulatory orders have generated little more than endless litigation, with few tangible benefits for businesses and consumers. In short, the telecommunications industry is dealing with more regulation, not less.

The FCC's key assignment under the new law was to open up the local access markets and end the monopoly reign of incumbent local exchange carriers (LEC). However, as outgoing FCC Chairman Reed Hundt admitted in a recent speech, there is still "scarcely any competition in the local markets."

And there isn't much new long-distance competition, either. The FCC has not allowed any of the regional Bell operating companies to offer long-distance service in their own territories. Long-distance and cable television rates have gone up, and additional charges have been tacked on to local phone bills.

See **FCC,** *page 60*

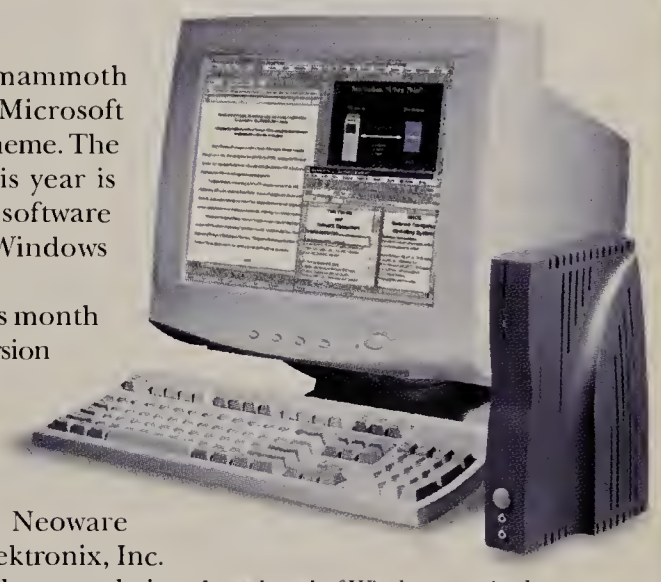
Hydra hype to hit Comdex

Microsoft multiuser NT to power Windows terminals.

By John Cox

Each fall at the mammoth Comdex show, Microsoft chooses a product theme. The apple in its eye this year is Hydra, NT Server software designed to drive Windows terminals.

The company this month will launch a beta version of the software — weeks ahead of schedule — with the help of hardware makers Neoware Systems, Inc. and Tektronix, Inc. The companies will showcase their new devices at Comdex/Fall '97.



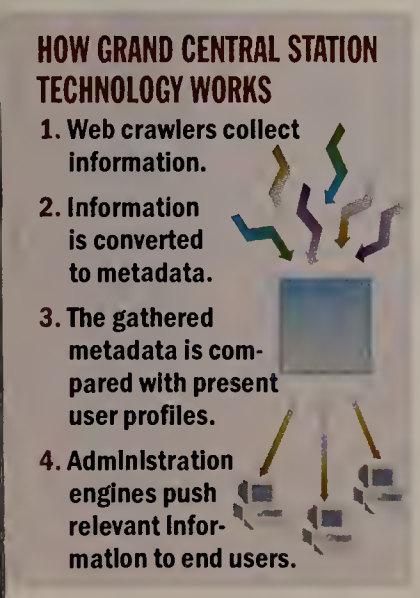
A new brand *of Windows terminals, such as Neoware's NeoStation 200 will tap into Hydra servers.*

Microsoft may need the extra beta time to prove to customers that Hydra will work as the enterprise-level application server of choice for thin desktop clients.

The early code also will give customers a chance to adjust their expectations: They are likely to find Hydra is a bare-bones server lacking the administrative tools and features such as clustering and load balancing that will be essential to large-scale, thin-client

See **Hydra,** *page 80*

IBM: All searches start at Grand Central



By Marc Songini

IBM has Java percolating in labs around the world and may soon be pouring multiflavored brews.

Among the Java technologies under development are a special search engine called Grand Central Station (GCS), a Web site mapping and referencing tool called Mappuccino and Java agents called "aglets" that act on a user's behalf.

The company's love affair with Java is no secret. It has more than 2,000 programmers working on Java in labs in the U.S., Japan, Israel and other locations worldwide, and is investing hundreds of millions of dollars into the technology, making IBM one of Java's premier backers.

One of the more interesting tools in the works is GCS, a push technology that was hatched at the company's Almaden research lab and is allegedly 100% pure Java. GCS is a combination search engine, push tool and filter that

See **GCS,** *page 18*

Cabletron packs MMAC-Plus with remote punch

By Robin Schreier Hohman
Rochester, N.H.

Cabletron Systems, Inc. today will announce remote access modules for its top-of-the-line MMAC-Plus backbone switch that should make it easier for companies to manage dial-up LAN access.

The new 9W006 and 9W007 modules will allow ISDN, analog

See **Cabletron,** *page 80*

Gigabit Ethernet hits fiber roadblock

By Jim Duffy
Arlington, Va.

Companies running Gigabit Ethernet over existing multimode fiber could trip on a costly and troublesome distance constraint.

Vendors are trying to hush up a physical layer problem that limits Gigabit Ethernet to 100 meters when used with existing multimode fiber, according to Jeffries Research, in Arroyo Grande, Calif. The distance problem may force

See **Gigabit,** *page 18*

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- The Gigabit Ethernet Alliance's position on distance issues
- A comparison between Gigabit Ethernet and ATM on the LAN that includes a distance discussion

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Union Pacific names Gateway 2000 supplier of the year.

[illegible] full steam ahead for [illegible]'s major accounts division, as the tra[illegible] mercial freight

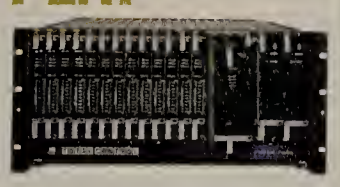
CINDY CHARLES

BACK TO SYBASE-ICS

Sybase CEO Mitchell Kertzman has the database company on the comeback trail. Our interview, Page 45.

3COM IP TELEPHONY PLAY

3Com has cranked out IP telephony and improved remote access features for its server card. Page 31.



SECURITY DOUBLE DIP

CyberSafe's Ari Medvinsky says customers can now mix Kerberos and public-key technology on their nets. Page 15.

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RANDEE LADDEN

FEATURES

EXAMINING THE FCC: *The first installment in a three-part series looking at why the FCC is failing to promote competition and what needs to be changed.* **Page 1.**

REVIEW: *What's the best way to build a VPN? We looked at four competing methods and determined that dedicated encryption hardware is the way to go.* **Page 55.**

SPECIAL FOCUS

Enterprise networks

Despite death notices, SNA marches on. Page 32.

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This Week

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Keeping Current. The sky is falling! The sky is falling! Or is it? Fred McClimans takes a look at the year 2000 hullabaloo and wonders whether we should all just pray for a large comet. **DocFinder: 4627**

DSL. We've put together a digital subscriber line (DSL) resources page that will help you quickly get up to speed on the technology and keep current on what's happening in the field. You'll find everything from primers on the various DSL types to breaking news and a database of DSL trials and deployments. **DocFinder: 4624**

Gigabit Ethernet. We've compiled a similar page for Gigabit Ethernet that also features everything from an audio primer to breaking gig news. **DocFinder: 4625**

Question of the week. A reader is floored by a problem with a Windows NT 4.0 workstation. He can get it to see shared directories on servers on the second floor of his building, but not on the first. A Windows 95 machine, however, has no problems getting to those directories. Suggestions? **DocFinder: 4626**

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News briefs, November 10, 1997

Actra alliance goes south

GE Information Services, Inc. (GEIS) and Netscape Communications Corp. last week announced they have signed an agreement under which Netscape will acquire full ownership of Actra Business Systems LLC, a joint venture formed in April 1996 between the two companies to develop electronic commerce software. Netscape will pay 1.5 million shares of stock valued at about $56.1 million for GEIS' share of Actra.

GEIS President and CEO Harvey Seegers put a positive spin on the split-up of the Actra alliance, noting GEIS will continue to resell Actra products made by Netscape for electronic data interchange over the 'Net.

However, the Actra alliance has worked out in favor of Netscape in terms of Netscape's greater success in selling Actra products to corporations and value-added networks competing with GEIS (*NW*, Oct. 6, page 1).

AT&T loses yet another top gun

Being a corporate chief information officer is notoriously insecure work. Being a high-ranking AT&T executive breeds insecurity as well. Now imagine being CIO of AT&T. The combination took its toll last week as Ron Ponder resigned his position as AT&T CIO to become president of Beechwood Data Systems, Inc., a Clark, N.J.-based provider of software and services to carriers.

Ponder had already lost much of his power because in May the authority for AT&T's massive unified billing project was shifted to Frank Ianna, executive vice president for network and computing services.

The company also recently turned over nearly its entire internal IS operation to its own outsourcing unit, AT&T Solutions.

ISPs adopting 56K dial-up platforms

AT&T WorldNet and GTE Internetworking (formerly BBN Corp.) last week separately announced 56K bit/sec dial-up modem support. AT&T WorldNet started deploying 3Com Corp.'s x2 56K modem banks throughout its network and said it should have a nationwide implementation by June 1998. Because there is no industrywide 56K modem standard, the Internet service provider also plans to deploy Rockwell Semiconductor Systems-Lucent Technologies, Inc.'s K56flex-based modems in its network.

GTE Internetworking has completed its nationwide rollout of Ascend Communications, Inc.'s K56flex modems. GTE Internetworking's DiaLinx Internet dial-up Internet access service users around the country today can dial into the company's network using any K56flex-compliant modem at no additional service cost. GTE Internetworking also plans to support international 56K dial-up support by the end of next year.

Juniper looks to IBM for big backbone technology

IBM and Juniper Networks, Inc. last week said Big Blue is providing custom Application Specific Integrated Circuits for Juniper's new class of Internet backbone devices as part of a strategic technology relationship between the two companies. Under the agreement, IBM is custom-designing the chips for Juniper's Internet product family, which will tightly integrate Juniper's software and IBM silicon logic.

Computer Associates gets large

Computer Associates International, Inc. (CA) and the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign last week announced a joint program to deliver a suite of ultrascalable extensions to Unicenter TNG, CA's enterprise management package. These new extensions, such as new event management policy-based features, initially will be deployed by Allstate Insurance Co. to enhance the manageability of its enterprise network. The scalability extensions subsequently will be incorporated in future releases of Unicenter TNG. The extensions are expected to help Allstate manage AS/400 servers, remote offices, data centers and approximately 50,000 workstations.

Bay's House in order

In first year, company shows marked improvement.

By Jim Duffy
Santa Clara, Calif.

People running for high office often ask the question, "Are you better off than you were 'X' years ago?"

Bay Networks, Inc. is better off than it was a year ago. That is the consensus of analysts, users and the company CEO himself.

Twelve months after former Intel Corp. executive David House took the reins of the foundering Bay, the company is back on track. Fiscal year 1998 earnings are expected to be approximately double those of fiscal 1997. The stock has rebounded to the point at which analysts say it is selling at a premium. House has restructured management, retained customer and reseller loyalty, and instilled confidence and a sense of united purpose among employees.

"I'm very happy with the first 12 months," said House, chairman, president and CEO of Bay. "Nothing ever happens as quickly as you want it to, but this turnaround has happened a little more quickly than I had anticipated."

"This company is back on the map," said Luke Szymczak of Prudential Securities, Inc. in New York.

That it is. But for how long?

There are significant challenges ahead for Bay that, if not met and overcome, could leave the company in the same precarious position that former Chairman Paul Severino and President Andy Ludwick left it in after they merged SynOptics Communications Corp. and Wellfleet Communication, Inc. more than three years ago.

Among the challenges ahead for Bay: defining a strategy and product line for addressing the Internet core; filling out its Adaptive Networking blueprint; and winning new business through "system" sales rather than individual product sales.

"They're selling a lot of BayStack 350 [workgroup switches], but the money is going to be in the systems business," said Craig Johnson, an analyst at Current Analysis, Inc., in Ashburn, Va.

For now, though, Wall Street is pleased. Bay reported record-level revenue of $601.3 million for fiscal 1998, which ended in September. This is an increase of 15% from the corresponding fiscal 1997 quarter.

Net income for the first quarter was $41.3 million, or 19 cents per share. Net income for the first quarter of fiscal 1997 was $5.6 million, or 3 cents per share.

Analysts say Bay is hitting the sweet spot of the Ethernet switch market by deftly marketing its BayStack 350, a sub-$300 per port 10/100 autosensing switch obtained from Bay's acquisition of NetICs, Inc. late last year.

"House has been able to manage Wall Street expectations and exceed in a very artful way," said Gina Sockolow of Schroder Wertheim & Co., an investment firm in New York.

Schroder Wertheim estimates per-share earnings of $1.17 for Bay in fiscal 1998, almost double those of fiscal 1997's 59 cents. Prudential is looking for $1.20 per share, while UBS Securities LLC expects $1.08.

Market analysts also are bullish on Bay and House's first 12 months.

"I think he's done all he was capable of doing," said Esmeralda Silva of International Data Corp. (IDC) in Framingham, Mass., of Bay's House. "Bay is going to be one of the companies to watch in terms of getting some market share within the network core."

"The products are moving," House said. "There's a clamor for the products, so we're pretty positive."

Bay now has to build on the momentum of House's first year, and he and the company realize that. To build, Bay has to recognize where its gaps are and aggressively commit to filling them, observers say.

The first gap is a lack of presence in the Internet backbone. Bay has yet to unveil a product and strategy for addressing the opportunity at the Internet core.

Every day that Bay does not have a product to sell into Internet service provider backbones is another day that rival Cisco Systems, Inc. comes closer to locking up that market.

IDC's Silva said Bay needs to produce a Gigabit Switch Router-like product for service providers. Current's Johnson agreed.

"Bay really doesn't have a story there," he said. "Their routers are good, but the core of the backbones are going to be these high-end gigaswitched ATM whatever animals."

Bay has a plan to address this

See **House,** *page 17*

David House's first year at Bay

November: Former Intel executive David House is named chairman, president and CEO of Bay Networks

December: Bay spends approximately $100 million in cash and stocks to acquire NetICs, a company developing high-performance, autosensing Fast Ethernet switches.

May: The company makes a big splash at NetWorld+Interop 97 when it announces Adaptive Networking, a product plan focusing on switching, access, IP services and network management. House gives a brow-raising speech, suggesting Bay could become the Compaq of the network industry.

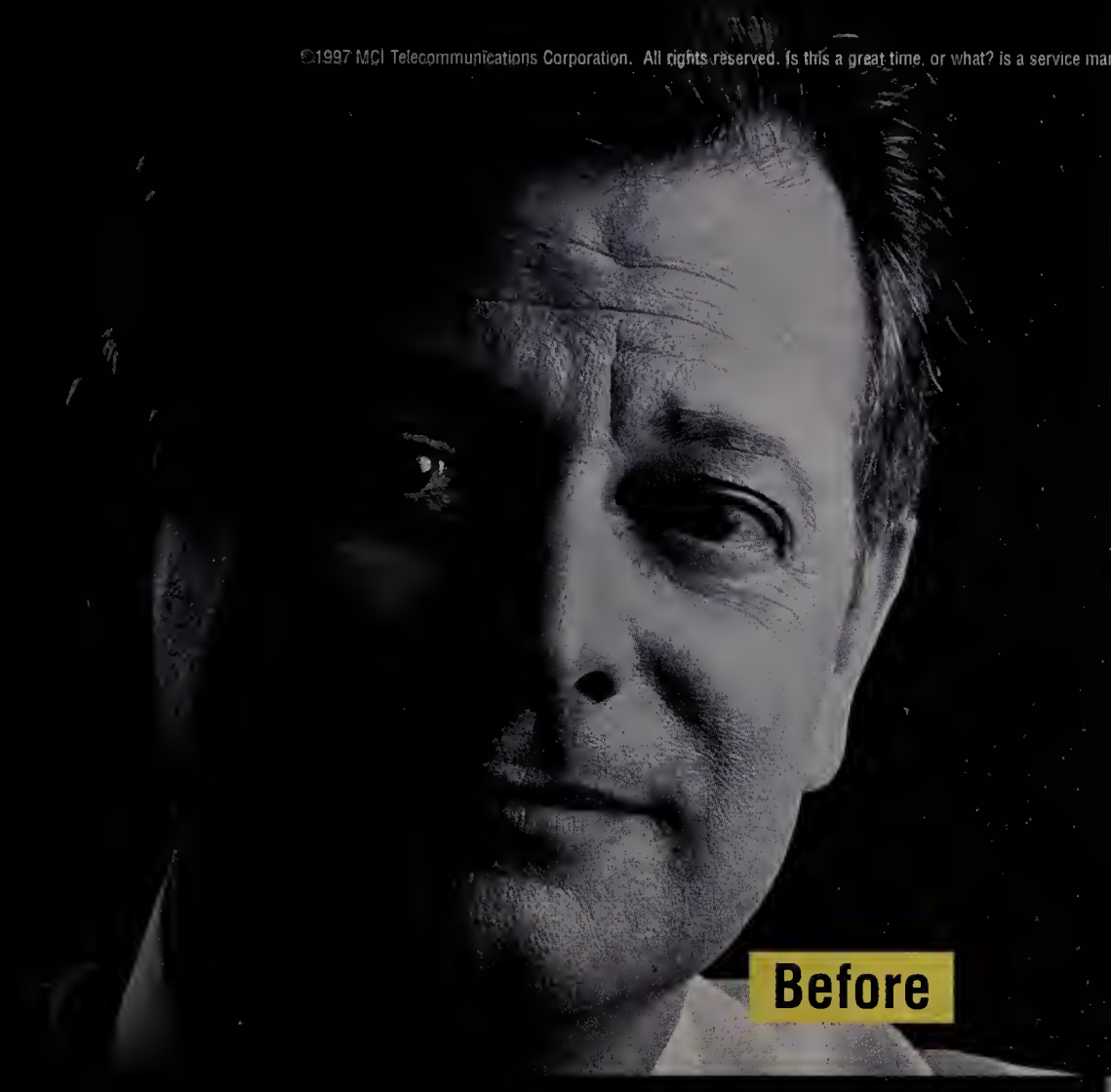
1996 | **1997**

June: Bay acquires Gigabit Ethernet product vendor Rapid City for $155 million.

July: Bay announces volume shipping of its SwitchNode routing switch.

October: The company changes its ad agency to increase its branding efforts; separately, Bay unveils its IP Services strategy for Adaptive Networking.

November: The company's stock is up roughly $15 per share from the previous November.



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Java: Coming to a server near you?

Vendors push Java server applications, but market may not be ready.

By Chris Nerney

The future of Java is on the server. Whether that future is here now, around the corner or well down the road is a matter of debate.

Many developers, vendors and analysts say Java's cross-platform ability will not be fully realized until the programming language is widely used to write portable server-side applications for business-critical transactions.

Attempting to fulfill that need, major vendors such as Sun Microsystems, Inc. and Novell Inc. already have launched major server-side Java initiatives. A number of smaller vendors, such as GemStone Systems, Inc. and Interactive Corporate Communications, Inc., also have developed their own Java business software to run on servers.

In addition, some observers expect server-side Java development efforts to get a big boost with the release of Enterprise JavaBeans (EJB).

This component software from Sun's JavaSoft division should make it much easier to construct complex server-based applications that run anywhere (see story, this page).

A public specification of EJB is scheduled to be released tomorrow. Anne Thomas, a senior analyst at Patricia Seybold Group, Inc., a consultancy in Boston, predicts "a whole class of products will be coming out in the next six months" based on EJB. Right now, most Java applications and applets are being written to run on the client side. Yet, problems have plagued Java on the client, in part because of browser incompatibilities that hamper portability.

"'Write once, run anywhere' hasn't really done that well on the client side," said Evan Quinn, an analyst at International Data Corp., in Menlo Park, Calif. "Java's platform-independent nature seems to work better on the server side."

Java's characteristics as a coding-intensive language are better suited to writing the types of customizable business logic applications that are run on servers, Quinn said.

Dave Clare, senior director of product management for Novell's Java Technology Group, said the server is the ideal place for "process-intensive" types of Java applications that would otherwise bog down a client.

"You don't want to download everything to your client," Clare said. "It takes too long. If I can push logic to the server, it offloads the time required to do processing work." Novell is working on building an infrastructure that will run intelligent agents from the server to perform tasks for users, he said.

Some large corporations are employing server-side Java now. Railroad giant CSX Corp., for example, uses a server-based Java program that enables selected customers to track their shipment on a car-by-car level through the Internet.

But vendors developing server-side Java software tools may have to wait for demand to catch up. "It's still quite early for server-side Java," Quinn said.

Another analyst said he does not expect to see widespread use of Java applications on the server side anytime soon.

"Server-side tools take a long time to develop. They don't have names like Java and Kona and cutesy little marketing messages," said John Biasi of Hurwitz Group, Inc., in Framingham, Mass. "These are bet-your-business types of applications, so people are cautious." ■

JavaSoft sharpens Java security

The sandbox security feature in the next Java Development Kit (JDK) will give programmers even greater control over what downloaded applets can do on their computers and networks, JavaSoft officials said last week.

Li Gong, chief security engineer for Sun's JavaSoft unit, said the new security model improves on the signed applet model offered in the current JDK 1.1.

The permission-based access control security model in JDK 1.2, due out next April, eliminates the notion of "trusted" remote code such as signed applets, he said.

JavaSoft's signed applet concept was created in response to developers' complaints that the original sandbox security model overly restricted their use of remote code.

The new security model will allow developers to use class loaders that screen local and remote applets to determine what functions they can be allowed to perform on a network.

— Chris Nerney

HIGH HOPES FOR JAVA

When Java becomes widely used across servers and applications, the top five uses for it will be:

1. Create new applications
2. Extend existing applications
3. Expand the intranet to partners and customers
4. Retire/replace in-house applications with Java-based solutions
5. Replace existing applications

SOURCE: ZONA RESEARCH, REDWOOD CITY, CALIF.

Enterprise JavaBeans spec debuts

Corporate and commercial developers are counting on Enterprise JavaBeans (EJB) to provide the magic that will accelerate the creation of server-side Java applictions.

Seven months after announcing EJB, JavaSoft tomorrow is expected to post specifications for the proposed API. JavaSoft officials promise that EJB will enable developers to easily build powerful, portable server-based applications.

EJB is based on the JavaBeans component model. JavaBeans are chunks of precoded software that can be joined to build a larger application able to perform on computers running a Java Virtual Machine.

Analyst Anne Thomas, of Patricia Seybold Group, Inc. of Boston, said the addition of component software to server-side Java provides a significant tool for developers. "With EJB, a person who is building application components can just write them once to the EJB spec," she said. "Customers can go grab those components and deploy them in any type of environment they want. That can't be done now."

Component software also enables programmers to modify and customize applications without needing access to source code.

The first specification for EJB originally was set for release last summer, and then last Monday. But complaints by development partners about revisions to the final draft reportedly led to the most recent delay.

JavaSoft reportedly has lined up a number of industry backers for EJB, including IBM, Netscape Communications Corp., Oracle Corp. and Sybase, Inc., all of which provided input into the specification.

—Chris Nerney

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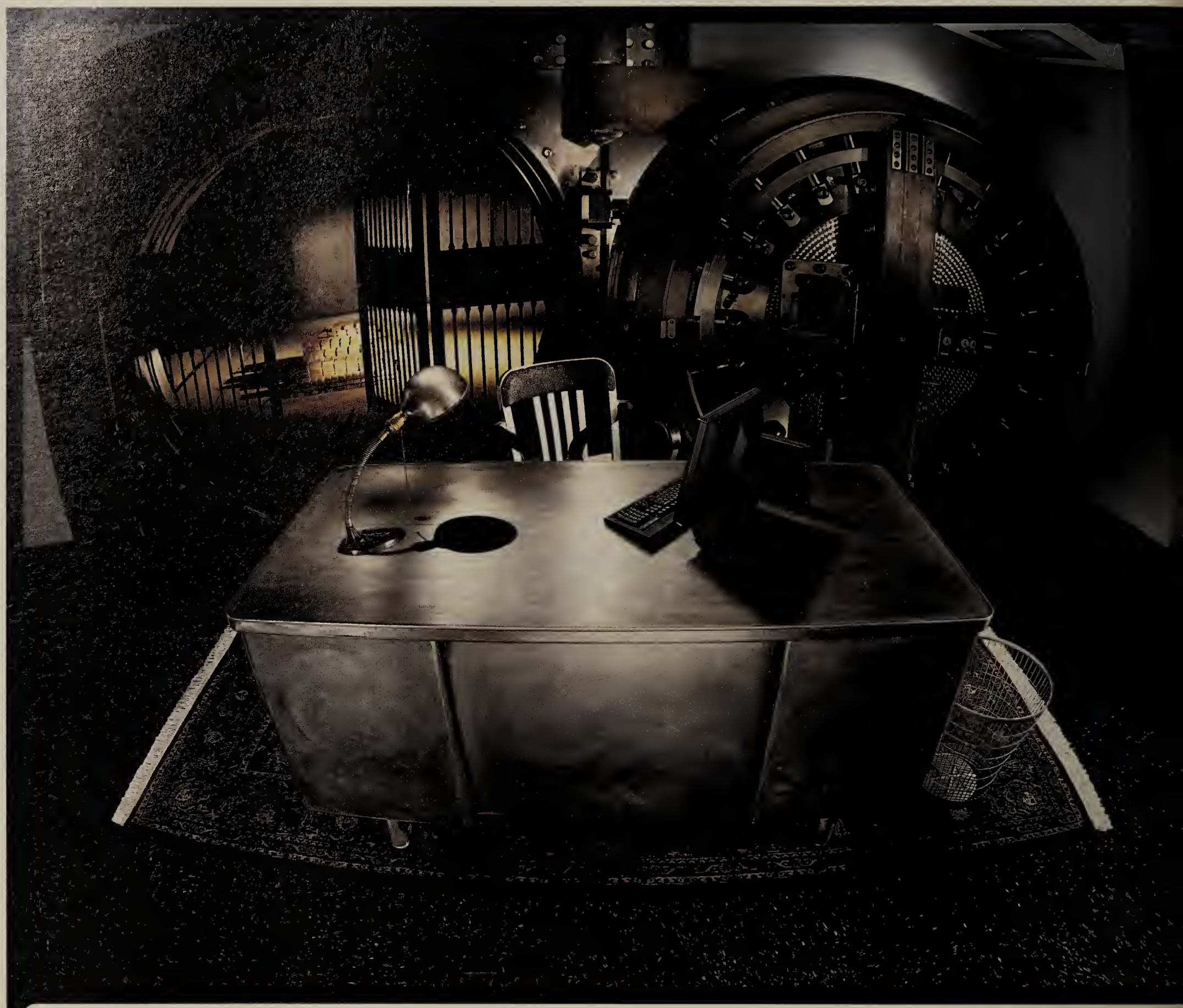

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MAE-East mayday answered with a $10 million Band-Aid

By Sandra Gittlen and Denise Pappalardo

What does $10 million get you? Maybe only a Band-Aid if you are operating some of the busiest Internet exchange points in the world.

That is exactly what WorldCom, Inc. is spending to fix MAE-East and MAE-West, its two metropolitan-area exchange (MAE) points that are buckling under the demand of Internet service providers. But according to experts, the $10 million WorldCom will spend over the next two years will not cure all its exchange point ills.

MAEs and network access points (NAP) allow ISPs to exchange Internet traffic with each other. While there are well over a dozen MAEs and NAPs today, MAE-East, based in Vienna, Va., handles the most traffic. As a result, it is hardest hit by the increasing packet loss, frequent switch rebooting and overall network congestion that have come from the growth of the Internet. These problems are causing headaches for businesses that depend on the 'Net. Dwight Gibbs, chief technical fool for Web-based financial advisory firm The Motley Fool, Inc., knows this firsthand. His users accuse him of poor quality of service when Web pages are slow to appear. He then shows them trace routes he has done to track where slowdowns occur and points of congestion at the MAEs, he said.

WorldCom's Dan Lasater *says more fixes than the addition of DEC GIGAswitches (pictured here) are necessary at MAE-East.*

WorldCom and the ISPs have identified the problems as head-of-line blocking, which causes pipes leading into the exchange point to jam up. This results in packets being dropped and congestion. Dropped packets mean ISPs have to dedicate more resources to retransmitting, which, in turn, wastes bandwidth.

Packet loss at MAE-East recently has approached 40%, which has the ISPs that link to the MAEs screaming for upgrades. WorldCom got the job of fixing the MAEs when it bought original architect MFS Communications Co., Inc. WorldCom has answered the call with more Digital Equipment Corp. FDDI GIGAswitches, but most believe FDDI's days are numbered.

Past and present

Less than four years ago, MAE-East had a single GIGAswitch to maintain. Today, MAE-East has seven switches. Three switches recently were deployed as part of WorldCom's 1997 MAE-East/MAE-West $5 million overhaul. The other $5 million will be spent next year.

MAE technicians also revamped the MAE-East architecture. What was simply a ring of GIGAswitches strung together has become a mesh formation with one switch at the core.

"We've also dispersed high-load customers to reduce the stress on a single switch," said Larry Walberg, director of global network operations at WorldCom. Despite these fixes, WorldCom believes MAE-East still will reach full capacity by January, said Dan Lasater, vice president of broadband applications at the carrier. With the exchange point expected to reach full capacity in a handful of months, why invest millions in FDDI?

The question has many scratching their heads.

There are really only three technology choices for MAE and NAP operators today — ATM, Gigabit Ethernet and IP over Synchronous Optical Network (SONET), said Tim Weingarten, research associate at BancAmerica Robertson Stephens, a San Francisco-based consulting firm. Unlike FDDI, these technologies support wire-speed switching, he said.

When the MAEs and NAPs were first constructed, FDDI was a good, solid choice, Weingarten said. But not today. FDDI can only switch at 100M bit/sec. So if you are connecting to a MAE with an OC-3 or OC-12 connection, you will not get the full 155M bit/sec or 622M bit/sec respectively, he said.

Principal MAE architect Steve Feldman said WorldCom is not ready to commit to a single architecture, but is considering all the options. The second $5 million installment will help fund research to decide which of these technologies is best.

ISPs that are dependent on MAEs are not happy with WorldCom's choices thus far. "There has to be more thought put into the scaling of the interconnects," said Rodney Joffe, chief technical officer for Phoenix-based ISP Genuity, Inc.

Joffe also contends that WorldCom is already too late to solve the problem. "They should already be up and running with a test bed."

Motley Fool's Gibbs has been dealing with the MAE problems for many months and gets excited when UUNET Technologies, his ISP, enters into private peering with his customers' ISPs.

In fact, private peering is quite popular among top-tier ISPs. However, all ISPs maintain public peering connections to MAEs and NAPs around the country. ■

Internet exchange points

These are the original Internet exchange points created when the Internet first went commercial in 1995. Today, there are at least a dozen or more, including WorldCom-MFS' MAE-West site, in San Jose, Calif, that handles as much traffic as the original four. Most ISPs exchange a large portion of their traffic with other ISPs at the MAEs and NAPs.

Metropolitan area exchange (MAE) • Network access point (NAP)

Microsoft breaks into Unix browser market

Internet Explorer Web is browser becoming more than just a Windows program.

By Christine Burns

Redmond, Wash.

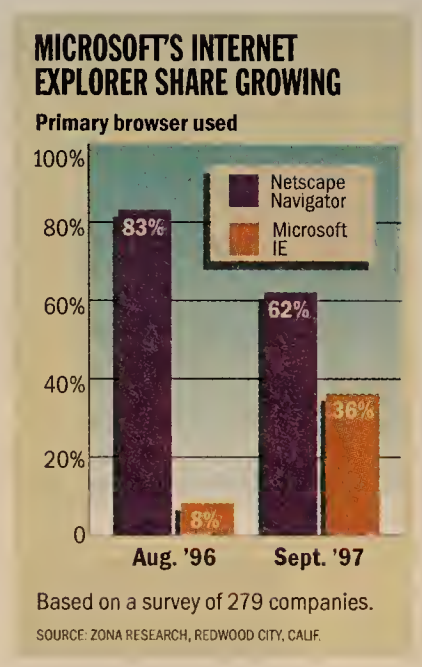
Microsoft Corp. last week began testing a beta version of its Internet Explorer 4.0 Web browser that runs on Unix.

The initial Unix support — coupled with beta releases of Internet Explorer 4.0 for the Macintosh and Windows 3.11 desktops announced earlier this quarter — helps to round out Microsoft's strategy of turning its browser into a cross-platform offering.

Industry analysts said the non-Windows versions of Internet Explorer are important for Microsoft because the browser's lack of cross-platform support has precluded many large corporations from standardizing on it.

"The reason companies don't use IE 4.0 across the board now is not because they think it's better or worse than Netscape [Communications Corp.'s Navigator or Communicator], but because it won't run on all of their platforms," said Harry Fenik, an analyst with Zona Research, Inc., of Redwood City, Calif.

The first Unix platform Microsoft will deliver Internet Explorer 4.0 for is Sun Microsystems, Inc.'s Solaris 2.5.1. This browser — which is available now on Microsoft's Web site — will ship in the first quarter of next year. Subsequent releases on Hewlett-Packard Co.'s HP-UX, IBM's AIX and Silicon Graphics, Inc.'s IRIX soon will follow after the Solaris version ships.



Internet Explorer 4.0 on Unix will offer Web accessibility features very similar to its Windows counterpart, said product manager Craig Beilinson. Unix workstation users will be able to access dynamic HTML content and use browser bars for easy navigation through Web information. In addition, because this version supports Internet Explorer Security Zones, network administrators can maintain control over the Internet content downloaded to Unix workstations.

Beilinson said the user interface strongly resembles that of the Windows-based Internet Explorer but has been altered slightly to reflect the Motif interface to which Unix desktop users have grown accustomed.

While this beta release does not support Webcasting or Microsoft's Outlook Express HTML e-mail client, the final release of the product will.

The Unix version of the browser — even in its final release — will not allow Unix workstation users to browse files resident on their machines or the local network, as users can do with Internet Explorer 4.0 for Windows 95 and NT. Additionally, this code will not allow users to download ActiveX components and run them inside the browser.

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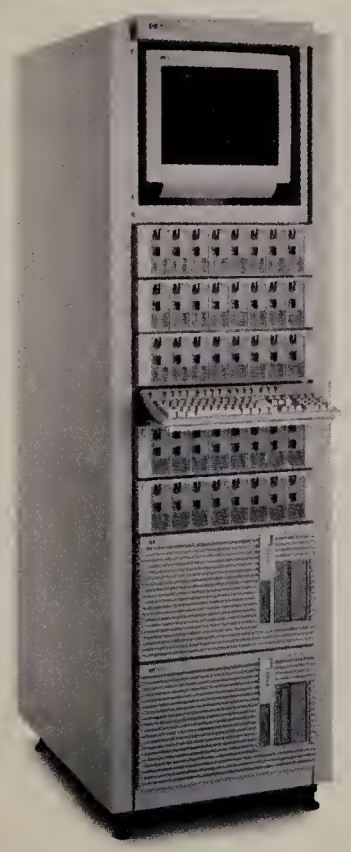

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Lotus takes wraps off Java applets

New eSuite JavaBeans designed to give customers an alternative to Windows desktops.

By Paul McNamara
New York

Lotus Development Corp. last week debuted a lineup of lightweight productivity applets called eSuite. The company hopes the applets will jump-start Java-based network computing and loosen Microsoft Corp.'s stranglehold on the corporate desktop.

Formerly code-named Kona, Lotus' new offering is being backed by a who's who of network computer (NC) and Java competitors, all of which share a desire to undercut Microsoft's marketplace dominance by realizing the "write-once, run-anywhere" promise of Java.

Initial reviews of eSuite have been positive, particularly because it is the first productivity package of its kind and is priced at only $49 per user. However, according to analysts and customers who attended the company's glitzy product launch here, the applets' success will depend on Lotus ironing out first-release wrinkles and its allies' ability to sell a thin-client paradigm as more than simply a dumb terminal replacement path. The eSuite product line includes:

- eSuite WorkPlace, a navigable desktop from which users may access e-mail, a Web browser, terminal emulation capabilities and productivity applets.
- The eSuite applet set that users can access via Java-enabled Web browsers for word processor, e-mail, calendar, spreadsheet, chart, presentation graphic and address book capabilities. These server-based JavaBeans weigh in at 550K- to 800K-bytes apiece.
- eSuite DevPack, which gives developers the applets and tools needed to fashion eSuite-based applications. The tools include Lotus' Infobus technology for stringing interactive JavaBeans together within an application or on a Web page.

With the release of eSuite, Lotus faces the possibility of cutting into its own share of the $4 billion office suite marketplace, which Microsoft Office controls. But that does not faze Jeff Papows, president of Lotus. Lotus owns 26% of the market based on unit sales and 9% based on revenue.

"Microsoft has a lot more to lose than we do," Papows said. "So, if there is going to be some cannibalization, we would just as soon set the menu and get on with it."

One industry analyst, while bullish on the direction Lotus has taken with eSuite, offered a cautionary endorsement.

"It's got cost advantages, but you're going to have to face up to some of the weaknesses in the product," said Tom Rhinelander, an analyst with Forrester Research, Inc., in Cambridge, Mass. He cited "kind of slow" downloads on the PC version and "rudimentary" browsing capabilities. He also questioned an end user's ability to easily organize large volumes of files.

One Notes developer said the eSuite user interface, which relies on text-based links rather than icons, could pose training challenges for PC-savvy end users. "It will take some time for users to get accustomed to this [user interface]," said Deepti Seth, a Lotus Notes developer at Republic Services Corp., in New York.

However, the simplicity of eSuite was seen a strong point by another potential customer.

"We have a lot of non-technical users and we don't want to give them something too elaborate," said Lou Gallo, senior programmer at Creative Health Services, in East Setauket, N.Y. "One of the nice things about this is you can't screw it up."

Lotus expects the NC version of eSuite to ship in January, with a PC version to follow by the end of the first quarter. DevPack will cost $1,495 per server.

✆ Lotus: (617) 577-8500

ON THE ESUITE BANDWAGON

Lotus last week announced a number of distribution agreements concerning its eSuite family of Java-based productivity applets, including:

Company	Announcement
IBM	Will ship eSuite WorkPlace with its Network Station 1000
Sun	Will deliver eSuite WorkPlace on its JavaStation
Oracle	Will ship eSuite applets with InterOffice; subsidiary NCI will include eSuite on the NCI platform
AOL	Will offer eSuite calendar and e-mail applets to subscribers
Netscape	Will make eSuite available through its Netcenter online service
Novell	Will deliver eSuite applets as an IntranetWare service

Customer reaction

Potential customers last week kicking the eSuite tires expressed keen interest in what the Java applets have to offer, particularly in NC environments. Nevertheless, it was apparent that Lotus still has a sales job ahead.

"It's a good start for the Java platform," said Antoine Najjar, assistant vice president for AXA Group, a French insurance company. "There are definitely some workers who will need more [functionality], but there are a lot who can be happy with this."

AXA has yet to commit to a thin-client future, he added.

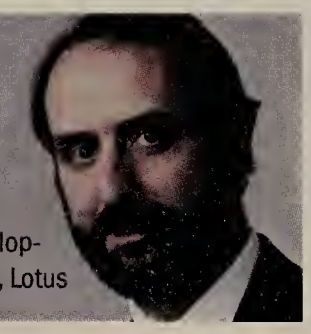
Java, NC seek common ground

Lotus, IBM, Sun, Oracle back 'Webtop Specification.'

By Paul McNamara
New York

In an effort to avoid needless pain on the network computing battlefront, a handful of NC competitors have joined forces with Lotus Development Corp. to spell out rudimentary rules of desktop engagement.

Lotus, its parent company IBM, Sun Microsystems, Inc. and Oracle Corp. last week pledged to jointly pursue a "Webtop Specification" that would define foundation characteristics of a standard NC desktop. It also would provide APIs to which Java developers could write with confidence. End users would reap the rewards of Java-based NC applications that operate across platforms on NCs or traditional client devices such as Unix workstations and PCs.



"We have had some preliminary discussions about potentially turning over this [Webtop Specification] to a standards body."

Joseph Forgione, vice president of business development and planning, Internet Applications Division, Lotus

The effort represents an important step forward for the fledgling NC movement because it will allow Java applications written for one NC desktop to run on any other desktop, according to industry analysts and independent software vendors (ISV).

"This needs to happen as soon as possible," said Jon Werner, director of strategic technologies at TriTeal Corp., a developer of Java-based applications and systems-level software, based in Carlsbad, Calif.

"In order to create a significant NC market and to be able to make the transition from Java applets to Java applications, this is a critical component," agreed Tim Sloane, an analyst with Aberdeen Group, Inc., a Boston-based consultancy. "I am delighted to see the Java alliance hold together on it and apparently agree to take the best of each partner and push Java forward."

Although complete details of the specification's range were not announced, a Lotus official said it would include areas such as application installation, user configuration, memory management, and print and help services. It reportedly will include a pure Java browser called Javagator, which is under development at Netscape Communications Corp. and is based on Sun's HotJava browser.

"We wanted to avoid a fragmented market where we would have multiple, incompatible implementations of various forms of desktops, which would cause confusion to all the ISVs and developers out there," said Joseph Forgione, vice president of business development and planning for Lotus' Internet Applications Division. "We all agreed that from a business standpoint, the desktop is not where we see us making our money."

A document describing the areas to be covered will be released within 30 days, Forgione said. This will be followed in the first quarter by a draft of the specification and a period of public comment. ■

AT&T hikes prices across the board

By David Rohde
Basking Ridge, N.J.

Reflecting the continuing high cost of WAN bandwidth, AT&T last week raised prices on all of its key network services.

The increase was especially stiff for users leasing high-capacity circuits, because competition is growing intense between Internet service providers and corporations for space on national networks. AT&T also has indicated a greater willingness to renegotiate user contracts to help mitigate some of the impact.

Last week's move included an across-the-board price hike of approximately 5% on frame relay ports and permanent virtual circuits.

This was on top of a similar increase last March (see graphic). On private lines below T-1 speed, AT&T raised prices

COSTS MARCH UPWARD FOR PORTS AND PVCs

Details of AT&T's second increase this year in frame relay prices:

Port speed (bit/sec)	Old monthly price	New monthly price
56K/64K	$270	$285
384K	$1,090	$1,145
T-1	$2,415	$2,535
Two-way PVC committed information rate (bit/sec)	**Old monthly price**	**New monthly price**
4K	$17	$18
16K	$30	$32
32K	$58	$61

CyberSafe doubles security

By Ellen Messmer
Issaqush, Wash.

CyberSafe Corp. next week will unveil software for companies that want to make their networks doubly secure.

The company is introducing a package that, for the first time, will let companies combine two leading authentication technologies — Kerberos and public-key encryption — to check user identities and control access to network resources.

With CyberSafe's Unix- and Windows NT-based TrustBroker Security Suite, companies can keep existing Kerberos systems intact and roll out new Kerberos systems while embracing public-key technology.

Many companies have invested significant amounts of time and money implementing Kerberos-based security systems to provide end users with a single sign-on to network servers and resources. The technology promises to become even more widely deployed given that Microsoft Corp. plans to include Kerberos in NT 5.0.

But many security-conscious companies also are considering public-key technology, which can be used to authenticate internal end users who need to access corporate network resources and electronic trading partners via the Internet. Public-key technology can be used to encrypt e-mail, among other things.

By deploying CyberSafe's product, companies can give end users with X.509 public-key certificates the ability to authenticate their identities at the TrustBroker hybrid public-key/Kerberos security server. In addition, end users with Kerberos software credentials can remotely gain access to their private X.509 certificate stored on the TrustBroker server rather than leaving the certificate unprotected in a desktop file. These access capabilities provide the advantage that an end user on the World Wide Web with a public-key certificate could be granted controlled access to an intranet already secured via Kerberos single sign-on technology.

CyberSafe's TrustBroker Security Suite enters beta testing next week and is scheduled for general release early next year. The product will cost about $30,000.

Standards effort afoot

TrustBroker Security Suite has been designed with emerging standards in mind, said Ari Medvinsky, a senior scientist at CyberSafe.

Work is under way in the Internet Engineering Task Force's (IETF) Common Authentication Technologies Working Group to define a standard for combining Kerberos and public-key, Medvinsky said. Although the specification is not expected to reach request for comment status at the IETF until February, CyberSafe is seeking to build TrustBroker based on the draft of the standard now available for review.

The CyberSafe TrustBroker Security Suite comes with client software, a security server, a TrustBroker Web Agent for the corporate Web server and a tool kit that lets developers modify applications to support Kerberos and public-key authentication.

CyberSafe will demonstrate its new offering next week at the Computer Security Institute conference in Washington.

© CyberSafe: (425) 391-6000

4%, while T-1 prices went up 6%. Prices for all circuits above 1.5M bit/sec, including fractional T-3, full T-3 and OC-3 private lines, were raised 10%.

The extra revenue is needed for AT&T's multibillion-dollar Synchronous Optical Network (SONET) buildout, said Steve Sobolevitch, AT&T's strategic pricing director for business markets, who also cited continuing spot shortages of wholesale T-3 network capacity.

Customers with combined voice and data contracts were hit hardest by the price hike. AT&T also raised by 3.9% the price of most large business voice services, such as Software Defined Network for outbound calls and Megacom 800 for inbound calls delivered over a T-I line.

Users last week were getting antsy about AT&T prices, saying they expect more increases. "We anticipate some upward pressure on prices, but we would like to see it get more under control than it is," said Reginald Bernard, assistant director of communications services at State Farm Insurance Co., in Bloomington, Ill.

Users were especially concerned with 800 rates, which increased, although AT&T has already raised 800 rates a few times this year. "This makes three or four [800] rate increases applied in a very short period of time," Bernard said.

AT&T officials did offer an olive branch. "Typically, the way to get higher discounts is to renegotiate your contract," Sobolevitch said. He said AT&T stands ready to discuss renegotiations "at any time. The majority of contracts do not go to full term."

Senior Writer Denise Pappalardo contributed to this story.

In-Site

Giant frame net sized for legacy, IP traffic

AT&T builds 7,000-node network for travel agency reservation system.

By David Rohde
Atlanta

For many network managers, successfully mixing legacy network traffic and TCP/IP applications on a single backbone is still just a dream.

But Brad Henson is about to live that dream — 7,000 times over.

Henson is a system advisor for WorldSpan, Inc., a travel reservation network run by a consortium of airlines. And he is enjoying the successful migration of reservations traffic running over a proprietary protocol known as Airline Link Control (ALC) to an AT&T frame relay network linking thousands of travel agencies.

The kicker? By ditching WorldSpan's massive but bandwidth-starved analog private-line network, Henson is poised to put new LAN-to-LAN and intranet applications on the same frame relay backbone. This will utilize spare capacity never before available to WorldSpan.

And with just 100 of the approximately 7,000 network nodes left to be installed, AT&T is poised to celebrate the completion of its largest frame relay network. The WorldSpan net is helping AT&T prove one of the key capabilities of frame relay: the ability to combine standard and proprietary data protocols over a single infrastructure. "It just doesn't make sense for us to run two access circuits, maintain two pieces of equipment and use two different topologies to do this," Henson said.

From PADs to FRADs

The new WorldSpan frame net replaces an older, slower packet data network that could not handle data traffic beyond travel reservations.

Years ago, AT&T installed packet assembler/disassemblers from Telematics International, Inc. at many of its points of presence to encapsulate the ALC traffic in X.25 datagrams. The Telematics PADs would poll nearby travel agencies via 9.6K multidrop analog private lines, then forward the ALC traffic over the AT&T network to the WorldSpan host here. Response time was acceptable, but left little or no margin for new applications.

AT&T's Ron Morrison and WorldSpan's Brad Henson *oversaw installation of 7,000 frame relay nodes to provide the wide-area infrastructure for an intranet.*

The new network, in contrast, boasts a deceptively simple topology with frame relay permanent virtual circuits (PVC) emanating directly from the data center to each travel agency.

"As far as the application is concerned, it's just one huge star network," Henson said.

Instead of X.25 assemblers in the AT&T POPs, WorldSpan went directly to each agency and installed Vanguard frame relay access devices (FRAD) from Motorola, Inc.'s Network Systems Division. Each travel agency utilizes a 56K bit/sec frame relay port on a nearby StrataCom PBX switch from Cisco Systems, Inc. in the AT&T frame relay network.

Although the frame network provides much greater bursting capability than the X.25 net, WorldSpan only subscribes the minimum 4K bit/sec of committed information rate (CIR) on each PVC. That means only 4K bit/sec of traffic over the circuit is protected against discard in case of congestion.

Because ALC is used for a terminal-to-host application requiring low bandwidth, the selection of 4K bit/sec CIR is sufficient for WorldSpan's initial needs. It also saves money because a two-way 4K CIR virtual circuit costs only $18 per month, even after last week's price increase by AT&T (see story, page 14).

Though it has not yet deployed them, that leaves WorldSpan free to develop new applications that can employ the unused port capacity. WorldSpan will offer intranet applications such as interactive, which is Web-based training to supplement WorldSpan's on-site training for agents at its headquarters here. WorldSpan also plans to include content from hotel chains, cruise lines and other tourism organizations on its intranet so agents can access the material via their browsers.

"We'll just be opening up new PVCs," said Ron Morrison, AT&T's global account director for WorldSpan. "The FRAD will decide whether it's reservation or IP traffic and route it accordingly."

Going interenterprise

The WorldSpan installation offers object lessons in sizing a giant frame net and in setting up an interenterprise network — the current Holy Grail of ISPs that are promoting so-called extranet services.

The first key decision was figuring out what size frame relay ports to use at the host site here to take in traffic from so many remote offices.

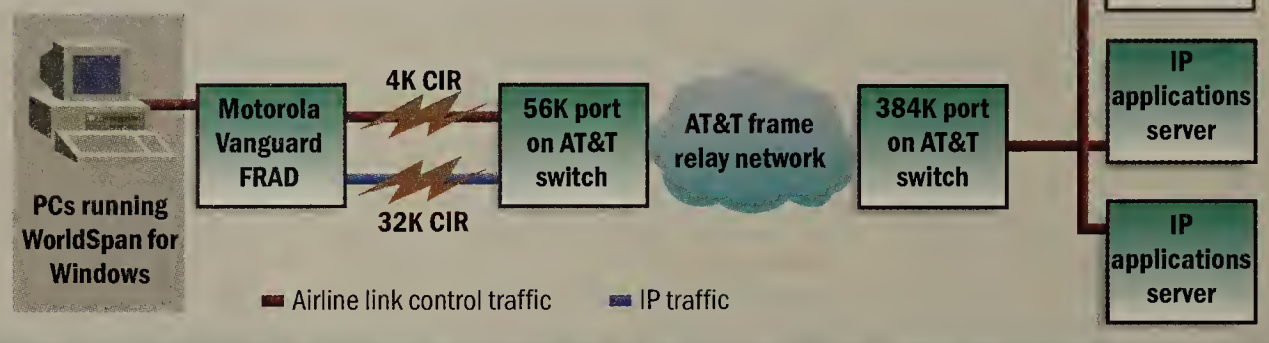
Instead of subscribing to the maximum T-1 frame relay connections offered by AT&T, WorldSpan chose multiple 384K bit/sec ports. That is because the maximum number of PVCs a single port can accommodate is 252. Even if all 252 remote sites sent 4K bit/sec worth of reservations traffic simultaneously, it would leave much of the T-1 capacity unused, Henson explained. Even assuming the IP applications eventually would eat up the rest, Henson wanted to chop the network into manageable pieces to keep a close eye on performance.

Since last January, AT&T has brought up network nodes at the rate of up to 200 per week. WorldSpan fed AT&T a running list of locations it wanted to bring up over the next 45 to 60 days. Even more critical was communication with the travel agencies. Most were told to expect the arrival of installers from subcontractor Wang Laboratories, Inc. toting the Motorola FRADs. That required some extra hand-holding, Morrison said. "Some of the travel agents would say, 'What are you installing? I didn't order anything.'"

To ease the transition, WorldSpan offers travel agents a custom application suite called WorldSpan for Windows. The current version for Windows 3.1 and Windows for Workgroups includes intra-office e-mail and allows agents to open 10 reservation screens at once. A planned Windows 95 upgrade will better accommodate the IP applications such as Web-based training, Henson said. ■

One big interenterprise network

Frame relay access devices (FRAD) installed at each travel agency will encapsulate and split multiprotocol traffic for agents to conduct reservations and terminal-to-host sessions, as well as use other applications.



Chase moves financial transactions to Web

By Ellen Messmer
New York

Chase Manhattan Bank this week will announce it is taking the first step toward using Java and the World Wide Web to handle corporate financial transactions.

This December Chase will start distributing Java-based Chase Workspace. The software will let the bank's financial officers place cash-management orders and gain access to investor services through a Chase Web site. Until now, Chase has provided corporate treasurers and their staff with Windows-based dedicated workstations, such as the Chase Insight platform, so they could electronically send investment instructions to the bank.

To simplify access to Chase services, particularly for smaller companies, the bank now will let finance officers establish an encrypted point-to-point IP link to a Chase Web server.

From there, finance officers can download a Java applet that will allow them to make payments.

"The applications are written in Java because it supports multiple operating environments," said Lloyd O'Connor, Chase vice president in charge of client access.

While the first release of Chase Workspace is aimed at handling the cash-management requirements of small-to-mid-size companies, subsequent releases will make use of Java applets to handle transactions such as investment-performance analysis and reporting.

The additional features will help to meet the needs of large companies. ■

FCC chief faces ISP access fee issue

Should Internet traffic be subject to a per-minute levy?

By David Rohde
Washington, D.C.

A new chairman last week took the helm at the Federal Communications Commission, but the process that got him there may force Internet service providers and their customers to keep a close eye on him.

Shortly after taking office last Monday, FCC Chairman William Kennard disclosed he had discussed with Sen. Ted Stevens, R-Ala., the possibility of forcing ISPs to pay per-minute access fees.


FCC's *Kennard*

Stevens last month threatened to delay Kennard's confirmation unless the FCC promised to re-examine its rules that exempt ISPs from the per-minute access fees paid to local exchange carriers. Those fees now are paid by long-distance carriers, but not ISPs, for completing connections.

Although he ultimately voted for Kennard, Stevens said he was concerned that exempting Internet traffic from such fees would rob phone companies of revenue needed to provide universal telephone service to all consumers.

At his initial press conference, Kennard said he did not make any promises to Stevens about ISP regulation in order to obtain his backing. But Kennard added, "I believe his concern is not a frivolous one in anyway."

Earlier this year the FCC — with Kennard serving as the commission's general counsel, or top staff lawyer — rebuffed pleas from Pacific Bell and other local carriers to impose an access fee on Internet traffic. That was following an avalanche of e-mails to the FCC opposing the idea (*NW,* March 17, page 8). But even if Kennard does not order another review of the proposal, it may pop up again.

Stevens reportedly is talking with Sen. Ron Wyden, D-Ore., about amending Wyden's proposed Internet Tax Freedom Act to include a provision redefining ISPs as "telecommunications carriers."

Currently, regulators treat ISPs merely as another form of end user that is buying services from local and long-distance carriers. The reclassification could mean that ISPs would have to contribute to the nation's Universal Service Fund, probably via some sort of per-minute levy on Internet traffic. The Universal Fund subsidizes phone companies to extend lines to rural communities and others located far from a switch.

Shortly after taking office, Kennard also said government approval of takeover bids for MCI Communications Corp. depends on proving that such a deal will increase competition for both consumers and business users.

"It's vitally important to ensure that the power of technology is realized in the lives of everybody in America," Kennard said. "There is a very real concern about consolidation in the telephony area, and I will be guided by an analysis of which bid will serve the American public best."

Kennard refused to commit to a schedule for reviewing the takeover bids. "There is no timetable that I'm aware of," he said. ■

House

Continued from page 6

market, but House would not discuss it.

Another loose end is Bay's Adaptive Networking strategy. Announced by House in May as Bay's product development and marketing sales blueprint, it still is mostly marketing babble with little product substance.

"IP Services was the first announcement that had some meat on the bones," said Paul Zagaeski, of Giga Information Group, in Cambridge, Mass. (*NW,* Oct. 27, page 33).

"We came out too loud on Adaptive Networking without enough of the story well-articulated," House said.

Bay also must hone its systems story — selling an entire enterprise network, from the desktop to the data center — in order to augment installed base sales with some new customer wins, analysts said.

House claims the BayStack 350 is bringing in a lot of new business but concurs on the system assessment.

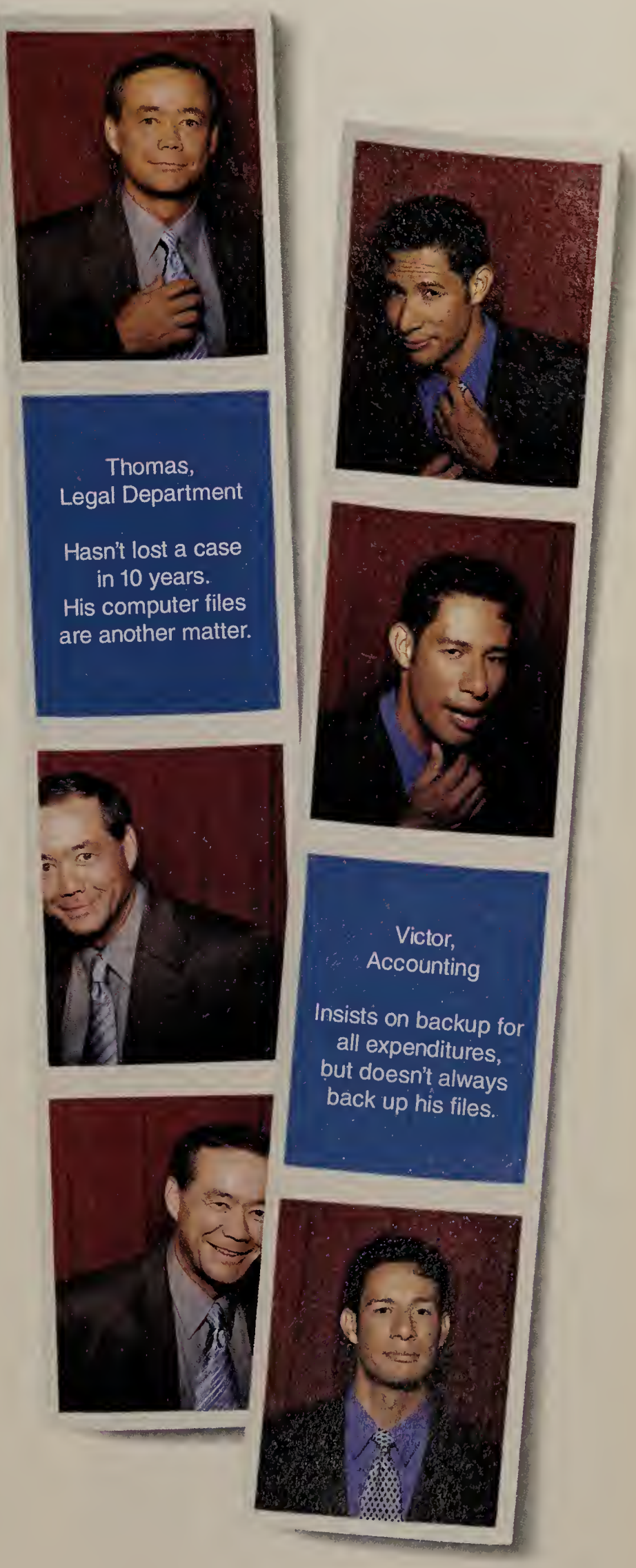
"We don't have the big network center switch to complement the 350 from a complete solutions standpoint," House said. "The Rapid City acquisition is the answer to that and that [switch] starts shipping next month."

Despite the remaining gaps, House has managed to keep customers with Bay.

"House has been a good change for the organization," said MichaelJohn Evenson, manager of technical services at The Children's Hospital of Philadelphia. "They've started to deliver product. They've started to respond to some of the things organizations like ours are looking for. I'm actually a very satisfied customer."

House is determined to keep it going. He carries with him a binder bulging with pages of internal, customer and financial goals and objectives for his next 12 months and beyond.

"They are written around our values: Customers are our top priority, innovation is what we do, people make a great working place and a great place to work," House said, pointing to a page listing key development programs and milestones for the coming year. ■



Gigabit

Continued from page 1

users to replace multimode fiber used for backbones within buildings with more expensive single-mode fiber. Analysts said that could double the price of Gigabit Ethernet products.

"Some of those single-mode products are priced twice as high [as multimode]," said Justin Smith, an analyst with International Data Corp., a market research firm in Framingham, Mass. "[Price] varies a lot, but there's definitely a significant price uplift." At the very least, users may have to run new multimode fiber with higher quality lasers, said attendees at last week's Next Generation Networks conference here.

Gigabit Ethernet is supposed to run from 260 meters to 550 meters over multimode, which is an optimum distance for building backbones, according to Howard Frazier, chairman of the IEEE 802.3z Gigabit Ethernet task force. Copper, meanwhile, is intended to carry Gigabit Ethernet frames 100 meters from wiring closet to workgroup, he said.

The distance problem occurs in 20% to 40% of installed multimode fiber, according to the Oct. 23 issue of the Jeffries Research newsletter. The problem was disclosed to Jeffries Research by a "well-informed source," the newsletter stated.

Ron Jeffries, president of Jeffries Research, did not return phone calls by press time.

According to the newsletter, Gigabit Ethernet devices running at equivalent speeds fail to operate reliably at longer distances because of a delay characteristic in multimode fiber.

The trouble occurs when a single Gigabit Ethernet light pulse enters the fiber. Instead of remaining a single pulse, it splits and runs down two independent paths. At the other end of the fiber there is enough delay between the two pulses that the information carried "can get very screwed up," and interoperability is compromised, the newsletter said.

Vendors have kept the problem quiet for fear of delaying approval of a final Gigabit Ethernet standard and cooling market acceptance of their products, the newsletter claimed. Vendors also may not be aware of it, according to the newsletter, because it is a very subtle problem and Gigabit Ethernet is an immature technology.

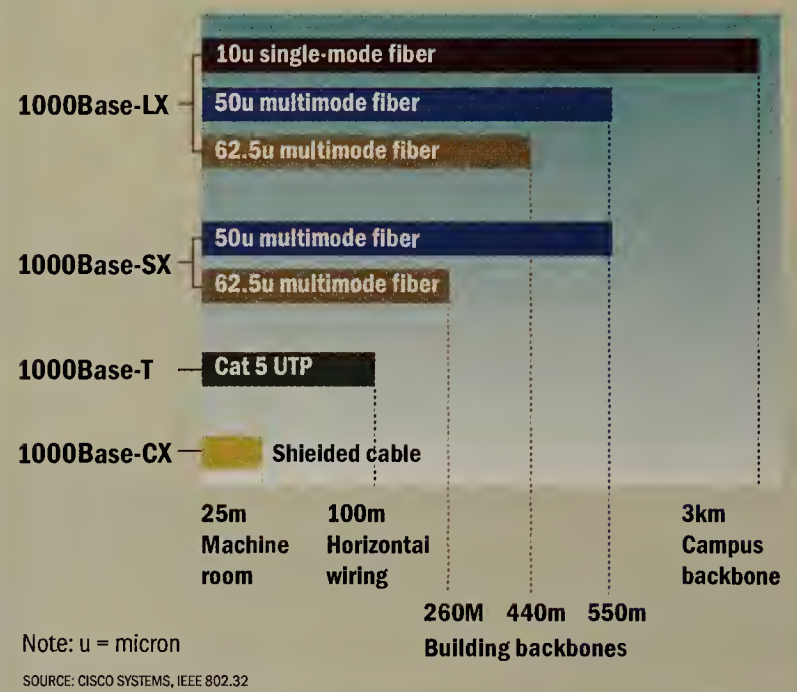
Nathan Walker, vice chairman of the Gigabit Ethernet Alliance and product line manager for gigabit multilayer switching at Cisco Systems, Inc., denied that vendors are trying to cover up the problem even though they have known about it for three months. "It's not that we're trying to keep it quiet. We're trying to resolve it," Walker said.

Also, Jeffries' percentages on how frequently the problem occurs are suspect, said Tony Lee, chairman of the Gigabit Ethernet Alliance and product line manager at Extreme Networks, Inc. Extreme has not had any problem building networks that span 350 meters over multimode fiber and has never experienced the multimode distance limitation problem, he said.

The Gigabit Ethernet Alliance soon will post a Q&A on its Web site that addresses the multimode fiber distance issue, Lee said. "It's the same problem [that crops up] with any high-speed technology over long distances," Lee said. Indeed, the Jeffries newsletter states that ATM is limited to 100 meters over multimode at speeds greater than 622M bit/sec. ■

WHERE GIGABIT ETHERNET FITS IN

The Gigabit Ethernet specification initially will call for three transmission media: long-wave laser over single-mode and multimode fiber (1000Base-LX); short-wave laser over multimode fiber (1000Base-SX); and balanced shielded 150-ohm copper cable (1000Base-CX). The IEEE 802.3ab committee is examining the use of unshielded twisted pair (UTP) cable for Gigabit Ethernet transmission (1000Base-T).



SOURCE: CISCO SYSTEMS, IEEE 802.32

In-Site

FedEx turns to Java-based application to improve package processing

By Ellen Messmer
Memphis, Tenn.

Measuring the volume of a Boeing 747 or the inside of a truck sounds like a school science project, but it can make or break a company such as Federal Express Corp.

A new Java-based application called Agiliti from Vitria Technology, Inc. is helping the overnight shipping giant answer that challenge.

FedEx sorts and ships one million packages per night through its processing hub here, and until recently, its managers scheduled shipping containers, trucks, planes and crews based on monthly estimates of projected package volume. But by using Agiliti, FedEx managers now are getting real-time information on package-flow volumes delivered to their desktops. This lets them more efficiently handle all aspects of their overnight delivery business.

The Agiliti software, which runs on Unix and Windows NT servers, collects every bar code scan made of a package's dimension or destination and records it as an object-oriented event. FedEx used to send this bar code-scan data directly over its WAN to a mainframe for later analysis.

"Before, everything was done by feel," said David Anderson, FedEx manager of sort-systems development. "But with Vitria's server technology, a manager has the ability to know the volume nearly in real time."

According to Vitria Chief Technology Officer Dale Skeen, the idea is that developers set up automated links to back-end databases by means of Vitria's predesigned or customized software Connectors. The Connectors encapsulate the data taken from the back-end systems in "object wrappers."

Agiliti uses standard Common Object Request Broker Architecture programming with the Internet Inter-ORB Protocol to transport data to servers and users' desktops.

✆ Vitria: (650) 237-6900

GCS

Continued from page 1

can be used to collect information fitting predefined profiles and delivering it to the end user.

It works like this: Users create a profile of the data they are interested in and initiate a search using a browser. The GCS program, which most likely will run on a server, dispatches crawlers over the network seeking the requested information. When the data is located, a "metadata" representation is created showing its location and details such as file length, date created and other specifications.

The metadata is delivered to a so-called "Gatherer" and is passed through a series of filters that winnow out useless material. Eventually the core data is delivered to the user's desktop.

The technology is partially intended to relieve users of the headache of sifting through mounds of data gathered by typical search engines. Besides being more selective, IBM boasts its crawler can ferret out data other search engines overlook.

GCS can vacuum information from a variety of respositories — corporate, news and Web servers, databases (including DB2), Post Office Protocol 3 mail servers, File Transfer Protocol site and CICS transaction servers — picking up everything from database files to Java bytecode.

Ultimately, GCS will be able to locate data based on qualities such as shape and color, a functionality known as Query by Image Content.

The Terminator

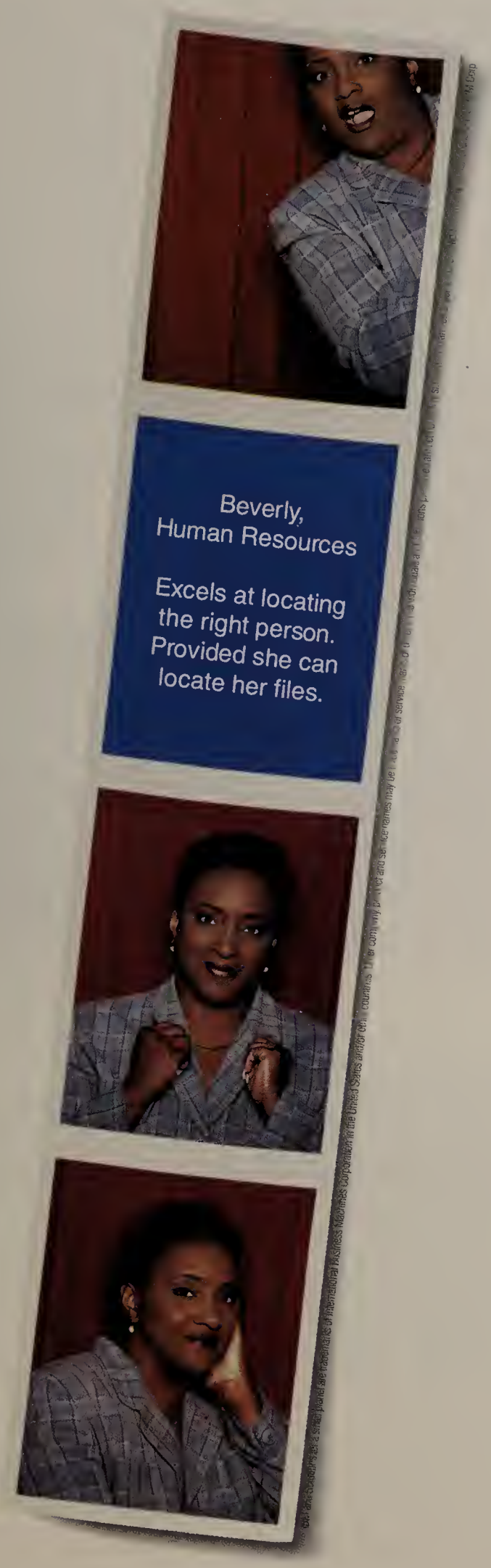
"Imagine you had Alta Vista and could use it across many different types of data formats," said Dan Ford, head of the GCS project. He claims GCS is the Terminator of crawlers. "The crawler will crawl into any file system — anything available in a network or a network connected file." Ford acknowledged that push technology is commonplace, but thinks GCS is unique in some of its details: It is probably the most far-reaching search engine and possibly the first one entirely written in Java.

GCS is not yet slated for commercial production, but there is a strong possibility it will appear in some fashion, particularly as IBM's CEO Louis Gerstner has made it clear he wants the company to focus on research that can be taken to market.

One analyst said the technology would be useful, if for nothing else, to weed out crummy Web sites. "There is a lot of frustration for users in finding a Web site that provides the exact information they are seeking," said Ron Rappaport, of Zona Research, Inc., a Redwood City, Calif.-based consultancy.

GCS ultimately will be showcased on IBM's alphaWorks Web site along with another IBM technology, Mapuccino, a Java applet that can be used to create a graphic representation of Web sites. Developed in Israel, Mapuccino maps a 'Net site and also allows those sites to be stored for future use or shared with other users.

As part of IBM's Java strategy, in its Toyko lab it also has created Java aglets that "extend the applet concept into mobile agents," according to an IBM white paper. The aglets can be used to search out, access and manage corporate data. An aglet can begin execution at one computer and jump to another without having to start executing from the beginning. ■



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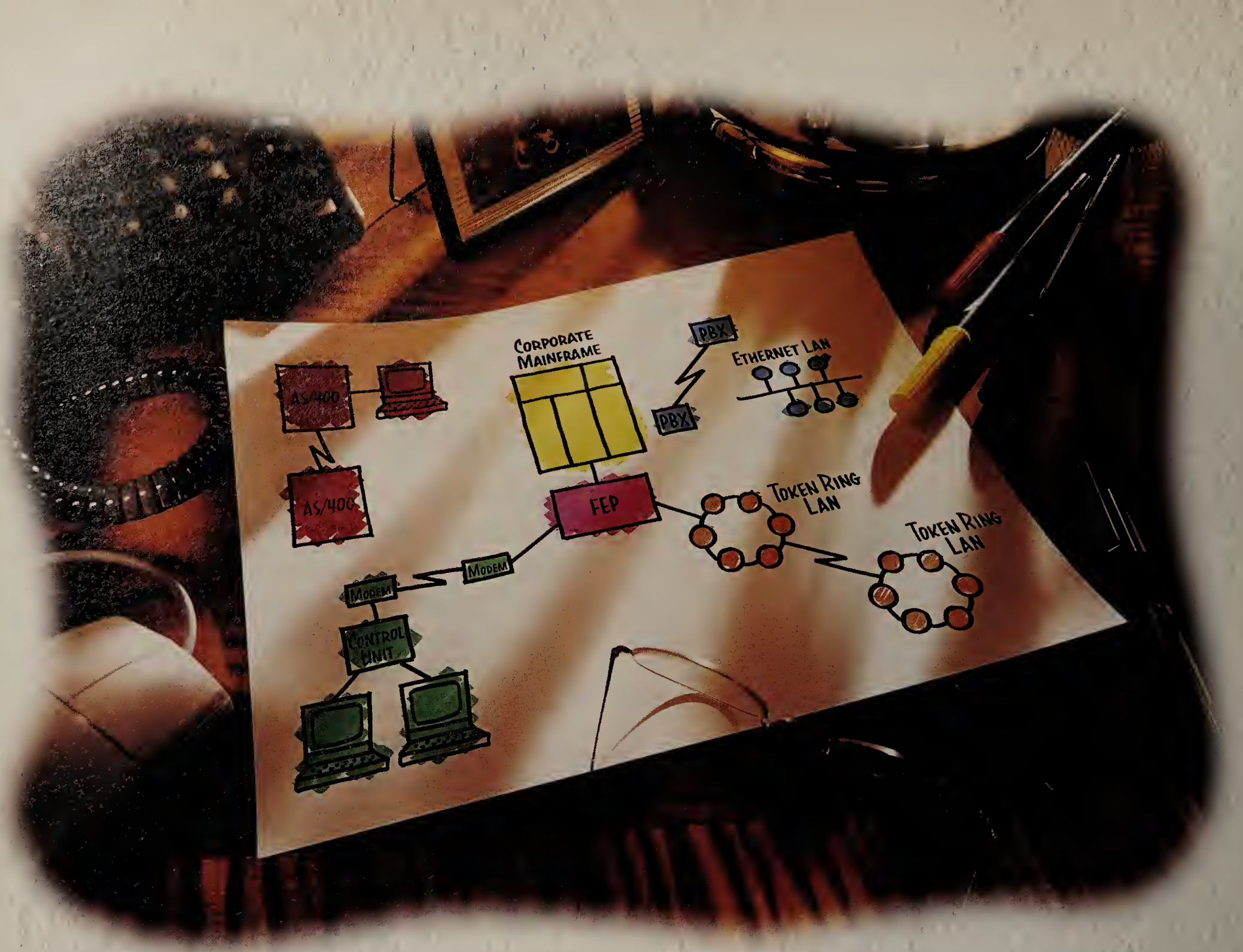

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Briefs

■ *Sunnyvale, Calif.-based* **NDC Communications, Inc.** *at Comdex/Fall '97 in Las Vegas later this month will unveil two new* **10M/100M bit/sec autosensing switches** *that*

COMDEX

are priced below the century mark per port. The company's Plug-n-Switch family includes the NSH500 five-port and NSH800 eight-port 10M/100M bit/sec LAN workgroup switches with a street price of about **$99 per port.** *The Plug-n-Switch devices provide customers with dedicated switching at the same price per port as shared-media hubs, industry observers said.*

The NSH500 Plug-n-Switch is priced at $635, and the NSH800 Plug-n-Switch has a list price of $995, although OEMs and value-added resellers plan to offer the boxes for less than $100 per port. Both devices will be available in the first quarter of 1998.

✆ NDC: (800) 632-1118

■ **NovaStor, Inc.,** *of Simi Valley, Calif., last week announced the immediate availability of a new* **network backup utility** *that uses the Internet or corporate intranet to provide low-cost online data backup and retrieval services.*

BackupNet is a Microsoft Corp. Windows 95 and NT 4.0 client/server backup product geared toward small to midsize companies.

It features an incremental backup technology called Patch Backup that only backs up the actual data that has been changed within any type of file. This minimizes the impact of the application on the physical network.

NovaStor currently offers a two-user version of Backup Net for free. The list price for a 10-user BackupNet license is $495.

✆ NovaStor: (888) 668-2782

HotJava Views: The inside story

By John Cox
Palo Alto, Calif.

The real heart of the emerging network computer technology may not be the hardware that sits on the user's desk, but the graphical user interface (GUI) on the screen.

Sun Microsystems, Inc. currently is beta-testing a new version of HotJava Views, the GUI for its JavaStation network computer. In designing Views, Sun's JavaSoft engineers deliberately rejected some key assumptions and conventions that currently shape Microsoft Windows.

Instead of a Windows desktop with files and applications on the user's PC, Views offers a "webtop" — a streamlined visual representation of applications, Web pages and data — all stored on networked servers.

"Your information is not tied to a physical machine [at your desk]," said Don Gentner, JavaSoft human interface designer. "It's on the Web, and you can access it from anyplace [and from any device] where you have Web access."

That is what caseworkers at the County of Santa Clara will be doing, first in 10 remote offices where JavaStations are being installed and eventually in the field, working with welfare and other county service recipients. "They'll be able to access their own set of applications and files as if they were at their desktop PCs," said Dick Crouch, president of CAT Technology, Inc., the San Jose, Calif., systems integrator working on the project.

JavaSoft's Don Gentner says, *"All the functionality [in HotJava Views] is on the surface, not in Windows or menus or dialog boxes."*

HotJava Views is the initial display to access or organize some 42 screens of the server-based application used by these caseworkers. "I really like the Views user interface," Crouch said. "The graphics are very, very nice, and Views has a nice, clean look to it."

JavaStation users first see the HotJava Views workspace screen. On the left side is the selector, which is a vertical bar that holds icons representing server applications, Java applets, Web documents and so on. Also on the selector bar are the Views office applets: an e-mail client, network calendaring applet and a naming or directory client.

A single mouse click will activate any of these icons. The application or document opens and is displayed in the Views workspace window, filling the space entirely. Clicking on a second icon completely replaces the first application with a second. The first application is automatically hidden in the background. Clicking on the first icon restores it to the workspace window.

HotJava Views' WebView *browser applet lets users access an HTML employee handbook and single-click on related information via Web links.*

"It's almost like switching channels on a television set," said Frank Ludolph, a JavaSoft user interface architect.

JavaSoft engineers designed Views after watching the work patterns of "transaction workers" using Unix or mainframe terminals for such applications as airline reservations or customer service.

"They use different screens and want to switch quickly between tasks," Gentner said. "They don't need lots of flexibility because they move through one call after another. But they do need to work very efficiently."

So Views adopts the one-window-at-a-time approach to cut down on the work needed to create, organize and manage different applications in different windows. And everything is activated by a single mouse click instead of two.

JavaSoft's *user interface architect Frank Ludolph*

A similar simplicity carries into what users see when they open a Views applet, such as MailView or WebView. There are no pull-down menus and only minimal dialog boxes.

Instead, all the functions needed are shown as buttons on a button bar. For example, users click on the MailView applet to read a message. To reply, they click on the compose button, which displays the composition screen overlaid on the main MailView screen.

See **HotJava,** *page 24*

NEC low end packs a big wallop

Company also beefs up server management software.

By Nancy Weil

NEC Computer Systems, a division of Packard Bell NEC, Inc., will unveil a low-price server at Comdex/Fall '97 in Las Vegas later this month.

The Express5800 ES1200 is designed for small businesses with fewer than 25 users as well as those who have been using desktop computers as servers.

"This is a more affordable choice for them," said Kevin Gray, an NEC product manager.

The server, which starts under $3,000, offers a 233-MHz, 266-MHz or 300-MHz Pentium II processor with 512K bytes of error checking and correcting memory.

The built-to-order ES1200 will ship by mid-December and come equipped with the server management software upgrade, which includes a Web-based interface, NEC officials said.

With today's announcement, NEC becomes the first vendor to "take advantage of the Intel Pentium II in the low-end and midrange server market," said Joseph Wei, NEC's director of product management. Gray said that using the Intel chips allows NEC to keep costs down and offer a server that is priced several hundred dollars less than those of competitors.

NEC also announced an upgrade to its integrated set of software tools for the Express5800 line and a new CD-ROM setup for installation and configuration of the server line. Previous server setups required the use of multiple floppy disks.

"With the CD-ROM, you don't have to swap floppies in and out," Wei said. The old system requires you to have somebody there, but the CD-ROM enables whomever is setting up the server to install the CD-ROM and walk away while it does its work.

Micron stands tall

In addition to NEC's server news, competitor Micron Electronics, Inc. last week announced two new four-way Pentium Pro symmetric multiprocessing servers. The NetFRAME 9008XP and 9016XP have 200-MHz Pentium Pro processors.

The systems have Level 2 cache memory and can handle software instructions more quickly than previous servers.

The new Micron server line is aimed at data and computing-intensive environments.

Pricing for the 9008XP starts at $12,595 and the 9016XP starts at $15,153.

For more information, contact NEC at (415) 528-6000.

Weil is a correspondent for IDG News Service's Boston bureau.

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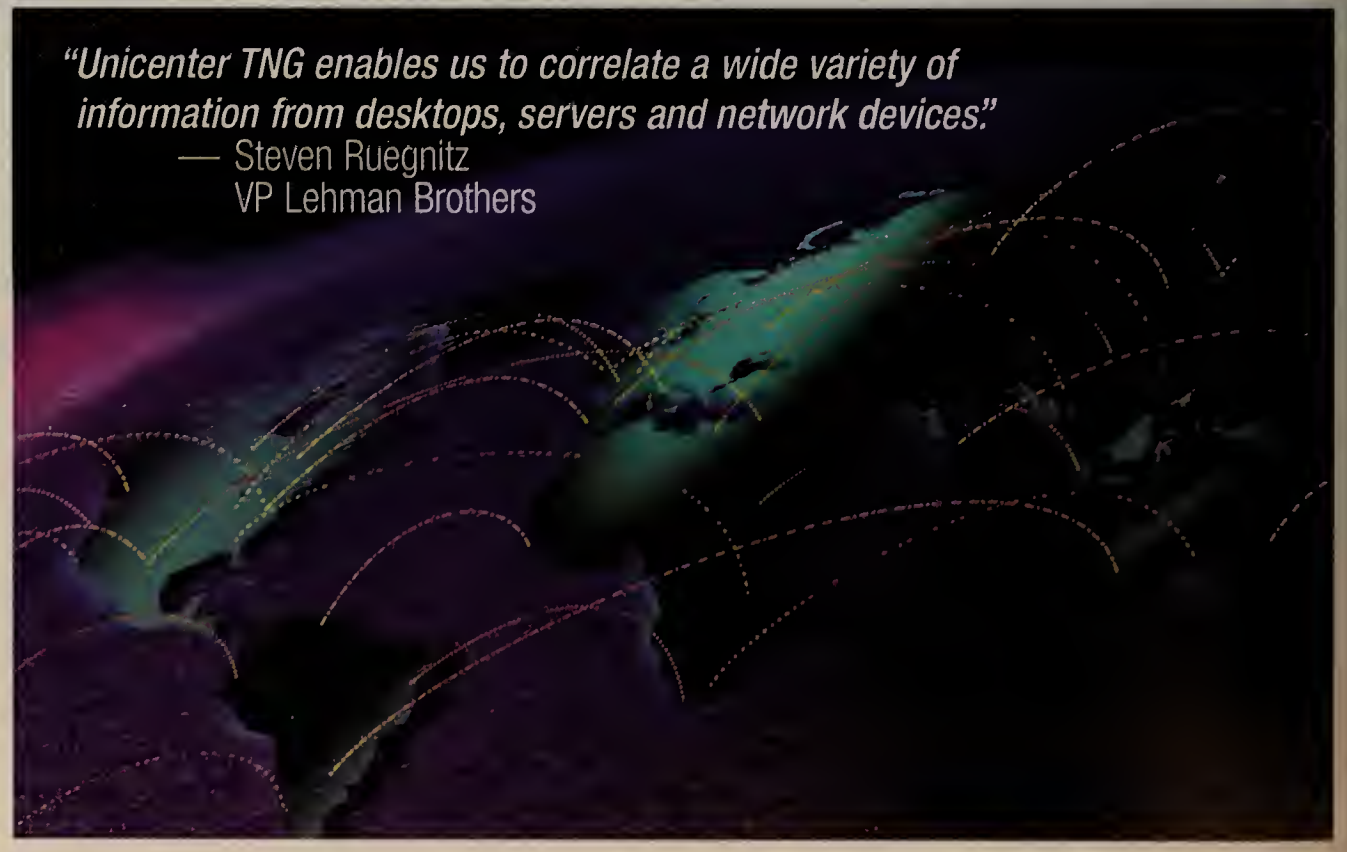

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Are we powerless against the Microsoft juggernaut?

Now that all my pundit pals have had their chance to explain what's going on between Microsoft, Sun Microsystems, the Department of Justice and Ralph Nader — in and out of the courtroom — I'd like to add my two-cents worth.

Just in case you've been stuck in the server room debugging a router problem for the past month, here's a recap of the issues. Sun has sued Microsoft — and has been countersued by the Redmondites — for violating its Java licensing agreement. See my Oct. 20 column for more on this story.

The Justice Department claims Microsoft violated a 1995 consent decree barring it from imposing anticompetitive licensing terms on PC makers. The Justice Department also says Microsoft unlawfully took advantage of its Windows monopoly by requiring PC makers to license and distribute its Internet Explorer browser as a condition of licensing its Windows 95 operating system.

Dave Kearns

Ralph Nader, who's taken on and beaten companies much bigger than Microsoft, has organized a conference, to be held in Washington, D.C., called Appraising Microsoft. There isn't much doubt, though, about what the appraisal will conclude — Microsoft's practices are bad, Bill Gates wants to control your life, etc.

It could be said about the Justice Department what was said about the Allied generals before World War II — they were always fighting the last war rather than getting ready for the next one.

Yes, Microsoft did force PC vendors to include Internet Explorer on the desktop as a condition for selling pre-installed versions of Windows 95.

But by the time the ruling works its way through the courts, Windows 95 will be a memory — Windows 98 and Windows NT 5.0 with their integrated browser technology will be the shipping versions of the Microsoft OS.

Microsoft will pay a fine, promise to never do it (whatever it is) again and move on in its quest to control every computer in the world.

Nader's meeting will do even less. It will trot out the same old tired voices telling us that Microsoft is too big and too predatory. We'll hear, once again, that Microsoft's application writers receive inside information from the OS groups to give them an unfair advantage in the marketplace. Blah, blah, blah.

I do see some ways to stop the Microsoft juggernaut. First, the Federal Trade Commission can stop the practice of automatically bundling an OS with new computers. How? Make it an optional item, priced separately just like the options on a car.

The FTC also can come down hard on bogus advertising and marketing practices, basically cut out the FUD (fear, uncertainty and doubt) factor and force companies only to talk about shipping or close-to-shipping products. This will affect most companies in the industry, though Microsoft as the biggest practitioner of FUD should be hit the hardest.

Another way to stop the juggernaut lies with the government. Just as there are standard definitions for what constitutes peanut butter and other commodities, there could be a standard definition of a computer operating system. The usual standards governing bodies simply don't have the clout to do this; Congress would need to step in and create a government entity to do it.

The final method, and by far my preferred choice, is for users to vote with their checkbooks. As Bill Gates once said, simply buy the best products. If we all did, there'd be no Microsoft monopoly to worry about. ■

Tip of the week

What used to be Symantec's Norton Administrator for Networks now belongs to Hewlett-Packard and has been renamed HP OpenView Desktop Administrator. What was a must-have tool now is even better. Go to www.hp.com/openview/products_f.html for the details.

HotJava

Continued from page 21

By contrast, Microsoft Windows applications can have commands in separate windows, under drop-down menus and in dialog boxes. HotJava Views also hides the underlying file systems, so users don't have to know file names and locations.

The next release of HotJava Views adds features that give systems administrators and end users more control over the Views screens. One is the addition of small panels that appear when the pointer arrow touches the border of the Views screen. The panels can have an application icon, a JavaBean component or an HTML link.

"I can just bounce the mouse pointer to the edge of the Views screen and get this bit of information no matter where I am [in an application] or what I'm doing," JavaSoft's Ludolph said. ■

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Briefs

■ **RAScom, Inc.** *last week introduced support for Microsoft Corp.'s Routing and Remote Access Service across its line of dial-up remote access servers, including the* **RAServer 2500,**

RAScom's RAServer 2500 *now allows server-to-server routing.*

allowing server-to-server routing and IP and IPX packet filtering for security.

© RAScom: (800) 898-5200

■ **Bay Networks, Inc.** *last week began shipping new software for its remote access concentrators that features enhanced data compression and bandwidth allocation.*

Bay's **Remote Access Server** *software Release 5.1 delivers hardware-based compression and supports Microsoft Corp.'s Point-to-Point Compression technology. The software also features the Multilink Multichassis Point-to-Point Protocol for firing up additional bandwidth among separate remote access servers.*

Remote Access Server 5.1 runs on Bay's 5000 MSX-based Model 5399, the stand-alone Model 8000 Remote Access Concentrator and Remote Annex. The server costs $495; a hardware compression card is available for $995.

© Bay: (508) 670-8888

■ **IBM** *recently announced the 9729-041, a* **low-end optical wavelength division multiplexer (WDM)** *that can multiplex four duplex connections over a single fiber. WDM uses the colors of light, or optical wavelengths, to send large amounts of data over a single fiber channel.*

IBM's larger WDM box, the 9729-001, supports 10 full-duplex channels and costs about $250,000. The product ships Nov. 14. The price starts at $150,000.

© IBM: (800) 426-4968

Vendors target Internet, server management

Sequel unveils policy-based Net Access Manager 3.0; Miralink monitors server events.

By Jim Duffy

Two network management vendors have developed software designed to help users monitor Internet access and control LAN servers for less cost.

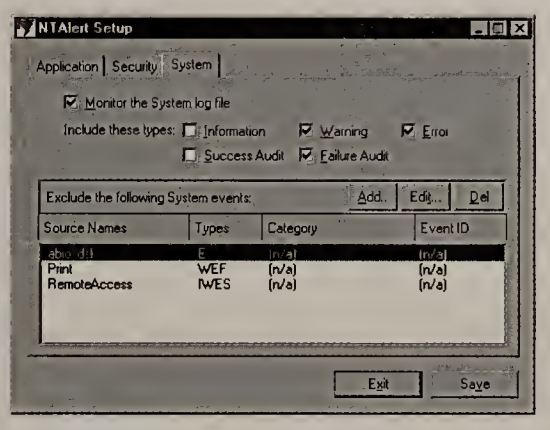
Sequel Technology Corp. this week will unveil Version 3.0 of its Sequel Net Access Manager product, which features enhanced policy-based management and reporting and extended directory service support.

Meanwhile, Miralink Corp. unwrapped Alert for Windows NT and NLMAlert 1.0, which provides real-time monitoring of NT Server event logs and NetWare file server console messages. The products cost less than $300 apiece, which is far less expensive than deploying a management platform with bolt-on third-party server applications, Miralink claimed.

Sequel Net Access Manager 3.0 runs on NT workstations and servers. It identifies, audits and reports on TCP/IP traffic and blocks or schedules access to the Internet at filtration points such as firewalls and routers. It also stores user profiles and IP traffic data in Microsoft Corp. SQL Server or Oracle Corp. databases. The product then synchronizes the information with a central directory service to enable or disable Internet access.

Version 3.0 supports Microsoft's Active Directory, Novell, Inc.'s Novell Directory Services and the Lightweight Directory Access Protocol. It now identifies users by logon name rather than by host name and IP address.

For enhanced policy-based management, Sequel Net Access Manager 3.0 now can enforce access policies at Microsoft and Netscape Communications Corp. proxy servers in addition to routers and firewalls. And the software's reporting capabilities now identify usage of protocols and applications by port, such as PointCast and RealAudio.



Miralink's Alert for Windows NT *provides real-time monitoring of NT server event logs and NetWare file server console messages.*

"It gives us a good representation of what our users are doing and whether or not it pertains to official business," said Tom Fischer, senior LAN engineer at the U.S. Army's Aberdeen Proving Grounds in Aberdeen, Md.

However, Fischer said he would like Net Access Manager to automatically generate monthly reports on HTML pages so he does not have to manually disseminate the information to managers and user groups.

Sequel Net Access Manager 3.0 costs $3,995 and will ship later this month.

Shipping now is Miralink's Alert for Windows NT and NLMAlert 1.0. The products convert NT server error messages and Novell NetWare server console messages to SNMP so administrators can receive real-time alerts before server failures occur.

NT error messages typically are sent to NT's Event Viewer, and NetWare console messages are usually stored in an event log. But administrators only access these files after a failure occurs, Miralink said.

Alert for NT 1.0 and NLMAlert 1.0 can run on any SNMP management platform, such as HP OpenView, or on Miralink's own UpTime Monitor console.

© Sequel: (206) 556-4000; Miralink: (801) 575-5465

FTP rolls out Java-based host access

Software company adds Web-based ties to SNA resources.

By Marc Songini
Andover, Mass.

FTP Software, Inc. is jumping into the hot Web-to-host market.

The software company recently announced OnWeb Host 1.0, which lets users link with mainframe- or midrange-based SNA resources via any Java-enabled Web browser.

Browsers, Web servers and other Internet access products are attractive to users because browser software is easier to install, configure and maintain than traditional SNA or other host emulation software.

FTP is entering a busy market: IBM, Cisco Systems, Inc., Interlink Computer Sciences, Inc., OpenConnect Systems, Inc. and others also have recently announced Web-to-host integration products.

And the market for Web-to-host software is considerable. International Data Corp., a Framingham, Mass.-based consultancy, predicts that Web-to-mainframe connectivity market revenue will jump from $5.4 million in 1996 to $1 billion by 2001.

FTP's OnWeb runs on a variety of server operating systems, including Windows NT, Unix and MacOS.

With OnWeb, users can access tn3270, tn5250, VT100 and VT220 applications.

The software also runs on thin clients, the company said.

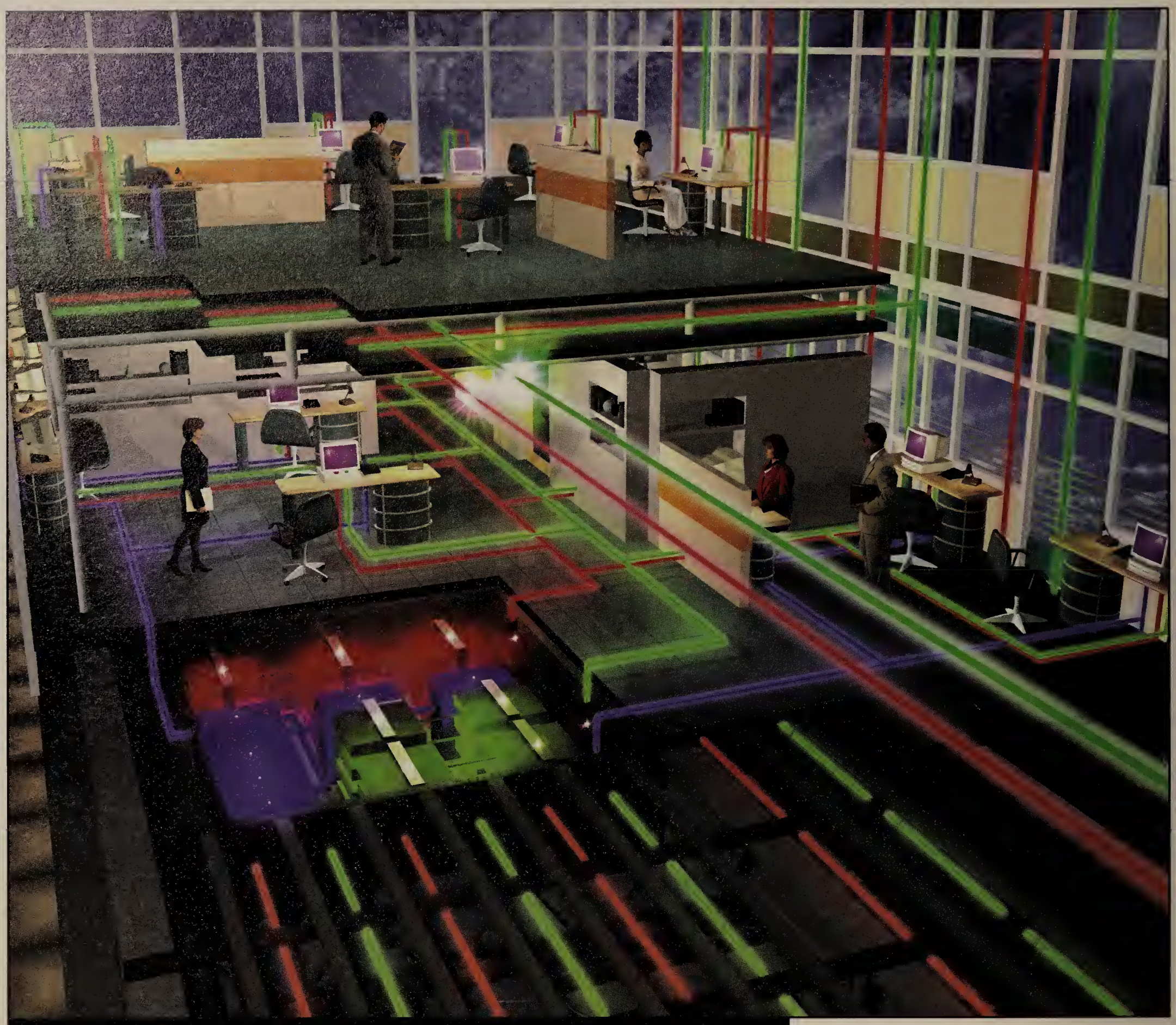
Users log on to the OnWeb server, which acts as the gateway to the mainframe. The server downloads a Java applet to the users' machines, which enables the device to communicate with the host.

The OnWeb server will authenticate the users and direct them to the appropriate destination. Not only does the server manage user connectivity privileges, but it will also record the user's session. Administrators can use the information to determine network traffic patterns.

OnWeb also has firewall protection and will work with any existing SNA-to-IP gateway, the company said.

The product is shipping now and costs $1,350 for a 10-pack license and $3,050 for a 25-pack license.

© FTP: (978) 685-4000



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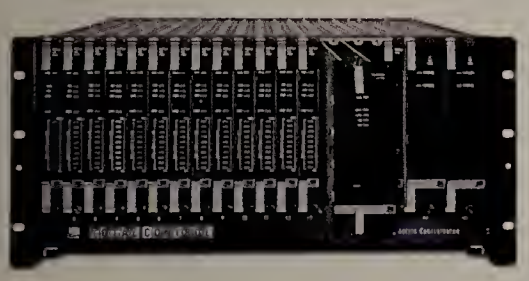
3Com adds IP telephony to remote access platform

By Tim Greene
Santa Clara, Calif.

3Com Corp. is changing the nature of its remote access server by adding power that will support IP telephony and video capabilities.

The company last week announced a more powerful version of its EdgeServer Pro server card, which fits inside the Total Control Remote Access Concentrator chassis.

Whereas the EdgeServer previously supported frequently accessed applications, remote access security, databases and Web pages, EdgeServer Pro has enough processing power to handle call control and setup for IP telephony.



EdgeServer Pro, *3Com's upgraded server for the Total Control Remote Access Concentrator, supports voice, video and data.*

In conjunction with 3Com's HiPer digital signal processing (DSP) card introduced earlier this year (*NW,* July 14, page 23), the Total Control box can act as a gateway between the public switched telephone network and packet networks.

A caller from a regular telephone could dial the Total Control box and be connected to a user on an IP network. The DSPs would packetize the voice.

Similarly, a T-1 line from a PBX could feed corporate calls onto an IP network. The voice functionality also could be used to support voice services over a managed IP network.

Voice-over-IP software for Total Control is due in the first quarter of 1998, the company said.

The EdgeServer Pro card sports one or two Intel 200-MHz Pentium Pro processors, an upgrade from the EdgeServer's original CPU, which was a single Intel 100-MHz 486 DX.

Some applications needed increased processing power, according to Greg Pfister, director of advanced technologies for Outreach Technologies, Inc., of Columbia, Md.

A heavily hit corporate Web site would strain the former EdgeServer, he said. "It depends on the application."

Since the initial release of EdgeServer, 3Com has introduced denser dial-up modules that can boost the capacity of the chassis from 48 dial-up calls to 264. The additional call load alone was enough to justify more processing and memory, Pfister said.

Total Control is a modular chassis that supports hardware modules for analog and ISDN dial up, T-1, frame relay and X.25 as well as Ethernet and token-ring connectivity.

The EdgeServer Pro card eats up three of the 16 slots on the chassis.

3Com said EdgeServer Pro also will support call control for videoconferencing. The DSPs will handle video-codex functions.

Base configuration of the EdgeServer Pro costs $10,593 and is expected to ship next month.

✆ 3Com: (408) 764-5000

SPECIAL FOCUS

Enterprise networks

SNA: The thing that wouldn't die

If the writing is on the wall for SNA technology, it must be written in invisible ink.

Without a doubt, TCP/IP rules the network world, but the market for SNA products and services continues to grow, albeit slowly.

That fact has forced SNA customers to integrate SNA- and IP-based nets and to configure more gateways to their mainframe-based resources than ever before. But users say, during at least the next decade, SNA will keep a steady grip on its massive installed base — mainly because throughout the world there are trillions of dollars worth of applications and data residing in its programming language.

Moreover, vendors, led by IBM, Cisco Systems, Inc. and a host of others, actively are creating products that allow networks to handle both SNA and IP architecture. These vendors are rolling out gateways, channel-attached routers and Web-to-host connectivity software to allow users to take advantage of both networking technologies.

Despite the predictions of death that SNA-sayers have been pronouncing for years, there still are vast numbers of SNA users out there. And true to SNA form, they are making gradual, not wholesale, concessions to IP technology. Indeed, the SNA empire is one on which the sun may never set.

"SNA is going to be around a lot longer than you or I are," says Jim Fletcher, senior technologist at IBM's Networking Software Products division. "It's one of those things that is going to be around forever. SNA has 'died' a couple of times already."

Companies are too heavily invested in and dependent on SNA applications that control such company operations as payroll, product ordering, data entry and distribution to abruptly throw them out.

However, in these days of distributed networks, users need to access SNA mainframe applications from their desktops, and the preferred route is IP. Indeed, the challenge to move to IP is not small. Companies "want to enable new clients to have access to mainframe applications over the Web without needing to rewrite the applications," says Ray Holland, marketing manager at Cisco's Interworks Business unit.

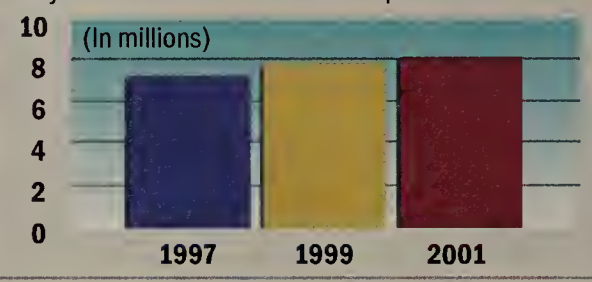
However, just as the Roman Empire absorbed barbarian tribes as its own citizens, SNA grafts on new technologies. A variety of technologies are on the market, such as IBM's High Performance Routing (HPR) and the recently released Enterprise Extender (EE). HPR is an IP-like technology that allows data to be rerouted in case of a path failure.

EE is its logical extension, a hardware/software package that allows HPR-based communications over an IP net without using other SNA encapsulation techniques, such as Data Link Switching. How much widespread use these technologies ultimately receive remains to be seen.

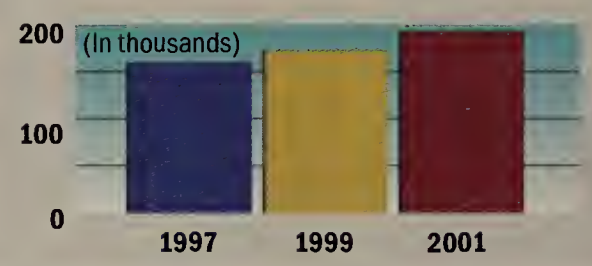
By Marc Songini

Snapshot of the SNA world

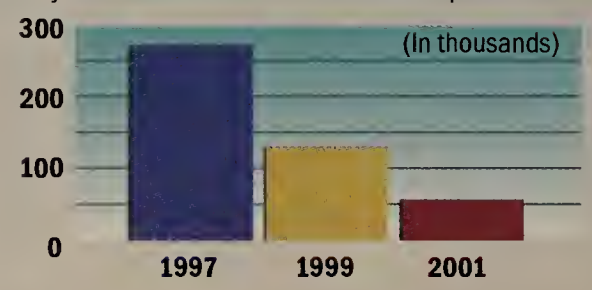
Projected worldwide SNA client shipments



Projected worldwide SNA gateway shipments



Projected worldwide 3270 and 5250 shipments



SOURCE: IDC, FRAMINGHAM, MASS.

"SNA continues to evolve," Fletcher says. "We don't just tolerate new technologies. We exploit them."

IBM also offers products such as parallel sysplex configurations for increased availability, Fletcher says. And there are millions of tn3270 and tn5250 emulation packages that allow SNA clients to connect with SNA mainframe resources over IP-based nets.

"We think SNA is going to be around for some time," says Jerry Wetherington, systems coordinator for the University of Florida in Gainesville.

"Integrating SNA and IP is going to extend SNA's life. And there are still a lot of people running Advanced Peer-to-Peer Communications and it will take them a long time to get away from that."

Wetherington and other IS managers agree that IP eventually is going to dominate. But Wetherington claims SNA has at least another five to 15 years of life left in it.

"IP is the wave of the future," he says. "There's no doubt in anybody's mind. For the most part, new applications are being written in IP and people are migrating to IP. It's everywhere now."

Wetherington's network consists of 10,000 to 15,000 clients that operate data processing and other administrative applications. SNA, unlike IP, doesn't have the same bottleneck and scalability problems, he says. SNA also has security features that IP lacks.

"We're not expanding our SNA environment," Wetherington says. But moving to IP will not happen overnight. "There's definitely still a need and requirement for an SNA network," he says.

Even if users tried to abandon SNA wholesale now, it would take a long time for the crossover to be completed, says Ron Sanderson, a manager in the information services division of the State of Illinois.

His SNA network has 45,000 terminals statewide and relies heavily on Advanced Peer-to-Peer Networking. The network is used jointly by the state's Department of Human Services, the Department of Public Aid, the Department of Transportation and the state fire marshal. The network sustains 15,000 to 20,000 SNA sessions daily.

The Illinois state net also is interconnected with 50 other networks that run SNA. It wouldn't be an easy thing for them to drop it tomorrow and jump on the IP bandwagon.

Sanderson said he had started integrating IP into the network using the technology for WAN access and for e-mail operations. However, IP is more difficult to manage than SNA, and its availability and performance are also inferior. There already are tools in place to monitor and control SNA networks — tools IP-based nets don't have.

"We're just beginning to do exploration for Web enablement for the host. The tn3270 opens us up for security issues, and we're not ready to embark on it," Sanderson says.

In any case, for at least another decade there will be a need for SNA, he says.

It may be that the wisest approach is one that is ecumenical. At J.B. Hunt Transport Services, Inc., a Lowell, Ark.-based trucking firm, the network works best with SNA running from the mainframe to the server. From the server to the network, IP works best, says Ken Mangold, Hunt's network manager. He notes that IBM is working to maintain protocol support between the two types of network.

"I think we're on the middle ground," Mangold says. "We'll use which one we get the best performance out of and can control best."

To accommodate their mobile workforce, whose members carry computers in their trucks, they use IP. "[There, IP] is the only route to go without going through lots of hoops," he says.

Mangold's network has 7200 nodes and can support 4,000 concurrent SNA sessions. He notes that IBM is doing a lot to maintain protocol support, offering features such as HPR over IP and EE. "I don't see SNA going completely away," he says. ■

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Briefs

■ **AT&T** *has inked a deal with competitive local exchange carrier (CLEC)* **McLeodUSA, Inc.** *to use McLeod's networks to bypass local carriers. McLeod is the seventh CLEC to sign such a deal to enable alternative user access to AT&T's long-distance network. AT&T generally has not been building its own local networks. McLeod operates primarily in Iowa, Illinois, Minnesota, Wisconsin, North Dakota and South Dakota.*

■ **Wireless carriers are hopping mad** *about a bill introduced by Sen. Patrick Leahy (D-Vt.) to back cities and towns* **blocking construction of wireless towers** *and antennas. The bill would strip the Federal Communications Commission of the right to preempt such moratoriums to enable wireless network buildouts. "The plan robs America and Vermont of the promise of wireless communications," said Jay Kitchen, president of the Personal Communications Industry Association, a wireless carrier trade group.*

PCIA's *Kitchen*

■ **DTS Wireless,** *of Woodbridge, N.J., announced last week its ZAP-IT Wireless Inbox, which provides a* **one-mailbox package** *for mobile users. ZAP-IT Wireless Inbox lets laptop and handheld PC users link their existing LAN or Internet-based e-mail box to their mobile devices via Ram Mobile Data's wireless data net. Using a single e-mail account based on the Post Office Protocol 3 e-mail standard, ZAP-IT customers can access their messages wherever they are. Users pay a one-time setup fee of $500 to $1,000. The monthly charge is $9.95 to $99.95.*

© DTS Wireless: (503) 248-9468

MCI's PRI service up and running in eight cities

By David Rohde
Atlanta

MCI Communications Corp. has quietly introduced local ISDN Primary Rate Interface service in eight markets as part of its entry into the local exchange business.

The move fills out a growing family of MCI local services in big cities, ranging from ordinary business telephone lines to an end-to-end T-3 Synchronous Optical Network (SONET) service called networkMCI Broadband Connections.

Though it has kept the offering close to its vest, MCI now offers ISDN PRI service in Atlanta, Baltimore, Boston, Cleveland, Los Angeles, Milwaukee, Portland, Ore., and San Francisco, carrier officials told *Network World* last week.

By year-end or early next year, MCI will publicly launch PRI service in all 25 cities where it has built a local telephone network, said Frank Nigro, director of local services product management for MCI's Business Markets Division.

Pending launch

The official launch awaits completion of digital interconnections between MCI's local facilities and T-1 facilities it leases from other carriers. The leased T-1 facilities are used to backhaul ISDN traffic to customer sites off MCI rings in all 25 markets. MCI will include PRI service in all new markets it serves.

MCI has been targeting PRI toward specific users seeking special dial-up features along with their T-1 access lines (*NW,* Feb. 17, page 13). PRI is a T-1 service offering 23 channels bearing 64K bit/sec each of data or voice traffic in addition to one 64K bit/sec signaling channel.

Call centers are using the service to guarantee caller ID information on all types of calls — 800, local and long-distance toll. Such data generally is needed for "screen pops," which provide agents with customer data on their PC screens timed with the arrival of calls.

Internet service providers and corporate users with heavy-duty Internet traffic, such as big file transfers or new video-over-IP applications, also are seeking PRI, Nigro said.

MCI customers can add any of their local expenditures, from ordinary local lines to T-3 SONET, to their MCI long-distance contracts for additional volume discounts.

Many customers also can add their local voice and dial-up data calls to their Vnet plans, which provide discount rates and call-routing features via a traditional virtual private network.

But how much customers actually save over comparable regional Bell operating company services depends on the service and location.

For example, MCI recently filed a tariff with the Federal Communications Commission for the previously announced networkMCI Broadband Connections, under which MCI local SONET facilities in any two given cities meet with the MCI long-distance network for a door-to-door SONET connection.

The rates are stiff, running well into five or even six figures just for the portion between MCI points of presence and exceeding ordinary T-3 rates (see graphic).

For more basic services, MCI is setting prices about 10% below comparable RBOC services, according to Sarah Beardsley, MCI's vice president for local services.

The company also has introduced flat-rate business calling plans in places such as New York, where Bell Atlantic Corp. offers no such service. ■

PAYING FOR END-TO-END SONET

Monthly T-3 prices for the new networkMCI Broadband Connections service are steep

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Includes long-distance portion of service only. Local SONET circuits cost extra. Term and volume discounts not included.

US WEST deploys low-speed DSL service

First local carrier offering is a bit on the slow side.

By Tim Greene
Phoenix

US WEST, Inc. recently rolled out the first digital subscriber line (DSL) service marketed by a local exchange carrier (LEC).

While most LECs have been running DSL trials, US WEST is out of the gates with a tariffed DSL service called MegaBit.

So far, the service does not live up to its name: Speeds offered under MegaBit services range from 192K to 704K bit/sec. That is far less than the 6M bit/sec downloads asymmetric DSL is able to support over regular telephone wires.

US WEST is deploying high-bit-rate DSL (HDSL). While not the fastest, HDSL is the most mature and proven version of DSL.

Deploying a DSL service is challenging. For example, US WEST must limit the distance between the customer and the central office.

Even the weather makes a difference, according to Greg Gum, US WEST executive director of MegaBit service. The hotter the weather, the shorter the distance DSL carries on regular copper phone lines, he said.

Under average conditions, the service can only be extended to 12,000 feet from a phone switching office without adding repeaters to the line. Repeaters add cost.

In its initial rollout for the Phoenix area, US WEST is provisioning the service with a PairGain Technologies, Inc. modem at both ends of the line.

That results in racks of modems in the switching office to take in the customer lines, but US WEST has plans to swap them for a DSL multiplexer sometime next year. The company already has asked vendors to make proposals on the boxes.

The provisioning process for the service takes care of some of the challenges. US WEST installs Category 3 unshielded twisted-pair wiring to the customer computer from a DSL box on the outside of the customer premises.

In addition, an Ethernet network interface card and software must be installed in the customer's PC, so the PC can talk to the DSL modem.

Also next year, the carrier will offer rate adaptive DSL, which adjusts speeds depending on line conditions. The flexibility will allow US WEST to deliver the service to more customers, Gum said. The delay in settling on a primary vendor for DSL gear will give the price of gear, which has been dropping, a chance to drop more, he said. ■

US WEST DIGITAL SUBSCRIBER LINE SERVICES

Here's a look at the first DSL services marketed by a local exchange carrier:

Service	Speed	Monthly cost
MegaHome	192K bit/sec	$40
MegaOffice	320K bit/sec	$65
MegaBusiness	704K bit/sec	$125

Note: These are remote user-only services. Central site DSL feeds for corporate users cost $800 to $1,934 per month.

WebEngine lets users power their Web sites with corporate databases

By Denise Pappalardo

Lynn, Mass.

Shore.Net, a regional Internet service provider, is making it easier for users to add database access to their Web sites.

The ISP last week expanded its Web hosting service with WebEngine, Inc.'s WebEngine DB 2.0 software components. Shore.Net will add WebEngine's software to its existing Web server farm, allowing its Web hosting customers to link their corporate databases to their hosted Web sites.

WebEngine lets users keep their databases at their sites behind a firewall instead of handing the database content over to an ISP.

WebEngine DB 2.0 is made up of two components: WebExtender and RequestServer. WebExtender software is deployed on a Windows NT or Unix server at the ISP's server farm.

The package connects Internet users to the second piece of the software suite, RequestServer, which is deployed at the customer's site on a Windows NT or Unix server.

WebExtender can determine if an Internet user is looking for information stored on a database. The WebExtender sends the user to the RequestServer, which processes the Internet user's query.

Another choice

Today, most ISPs that offer database hosting in conjunction with their Web hosting services require that the database reside at the same location as the Web server. WebEngine's product gives users another choice. Because WebEngine's platform does not require database drivers to reside directly on the Web server, users can securely keep their sensitive corporate database information at their own sites.

Enterprise users do not want to farm out their databases to a third party, and they do not want to limit the use of their databases, said Ezra Gottheil, director of Internet business strategies at Hurwitz Group, Inc., a Framingham, Mass.-based consulting firm. By keeping a database on-site, it can be used for other applications, he said.

Shore.Net's service requires that users deploy WebEngine's RequestServer at their locations.

The server sits behind the customer's firewall and directly connects to the user's database or to a database firewall for further security.

Available now

The WebEngine features are available to Shore.Net Web hosting customers now, said Lowell Gray, president of the ISP, based here.

Customers will be charged a nominal fee for the WebExtender software, or it will be free, Gray said. The RequestServer that resides on the customer's premises lists for about $2,300.

Shore.Net hosts its customers' Web sites on shared and dedicated Web servers. The ISP's Web hosting services range from $30 to $3,000 per month. Shore.Net is not planning to charge an additional monthly fee for customers who use the WebEngine software.

✆ Shore.Net: (617) 477-2000; WebEngine: (617) 272-1111

Get more online:

- **WebEngine white papers**
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WAN MONITOR

ANTS and aliens portend Internet's future

The Internet isn't really broken, at least not yet, but nor is it sophisticated enough in its current state to support many of the business-to-business applications for which it is ideally suited.

The Internet Engineering Task Force is doing patchwork fixes to IPv4 while rolling most of its meaty upgrades, such as expanded address space and a rudimentary prioritization capability, into IPv6. But these efforts aren't enough to ensure that the Internet can keep pace with all the new applications for which it is being used.

How can the Internet keep pace with the very environment it created? Is it an environment so distributed and dynamic that a new type of semisentient life form may be needed just to help its growth, development and management?

For some, the solution is a self-configuring, self-programmable network that need not rely on centralized management and control. In such a model, the Internet would resemble an ant colony. Simple rules governing simple relationships would translate into a hugely scalable, organized and malleable internetwork environment.

Possible? Perhaps. Kenji Morrow, a reporter at *Wired*, interviewed researchers at the Massachusetts Institute of Technology who are working on a new architecture called Active Node Transport System (ANTS). The architecture uses mobile code technologies such as Java to make the routing and switching elements of the 'Net operate in a distributed, programmable environment. It doesn't use packets but instead is based on a capsule that contains programming code in the header. The nodes (routers and switches) of the ANTS-based Internet not only forward packets but also run the instructions included in the code.

Daniel Briere and Christine Heckart

The result? New protocols created on the fly for specific applications or new services. Functions currently handled at higher layers in the protocol stack, such as compression, instead could be handled by the intelligent network. Used in conjunction with IPv6, mobile connectivity would be easier to achieve, as capsules automatically would route to a person regardless of where or how he logged on to the net.

In some ways, the new architecture is like taking Web technologies for caching information and using URLs to locate sites and applying it to how the entire Internet operates.

An Active version of IP could help the Internet not only scale, but also mature to support a wider variety of applications. But the solution is not without major challenges. Security issues abound in an environment in which anybody can create a protocol at any time. Bandwidth scalability concerns, already a cause of mass insomnia with Internet engineers, could escalate into mass hysteria as ANTS and Active IP hit the scene.

Briere is president and Heckart is vice president at TeleChoice, Inc., a consultancy in Verona, N.J. They can be reached at dbriere@telechoice.com and checkart@telechoice.com.

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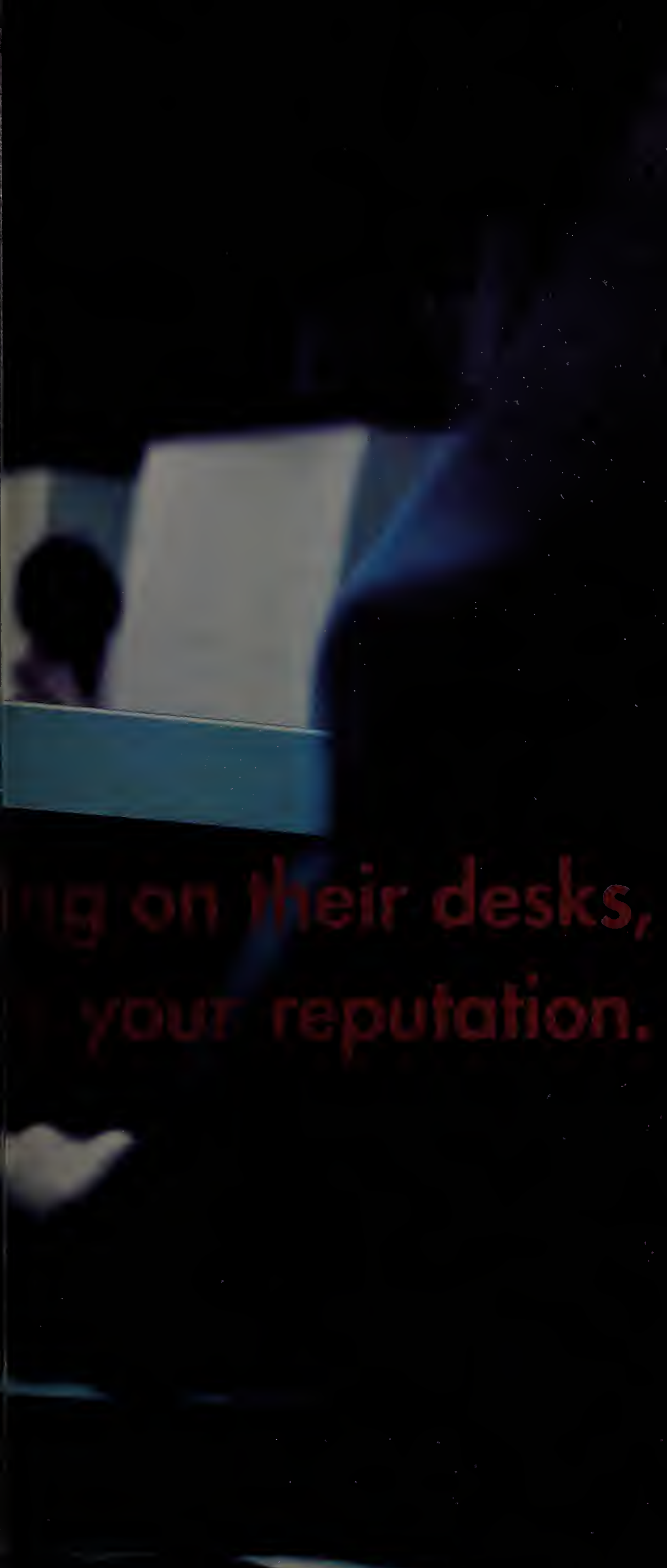

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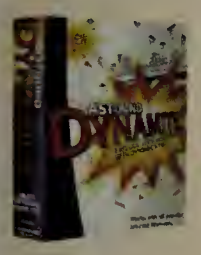
Briefs

■ **Astound, Inc.,** *of Palo Alto, Calif., last week released software that company officials said allows users to create* **interactive multimedia Web pages** *using dynamic HTML. Astound Dynamite is a point-and-click authoring tool that supports Java and ActiveX. It does not require scripting, plug-ins or knowledge of HTML. The tool features a timeline window that allows for synchronization of multiple events and objects on a Web page. Astound Dynamite costs $124.*



Astound's Dynamite *is a dynamic HTML authoring tool.*

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■ *Start-up* **Cloudscape, Inc.,** *of Oakland, Calif., next week will unveil its debut product,* **SQL Java data manager** *that can be embedded in distributed applications deployed via the Internet and intranets. The product, JBMS, is geared toward mobile employees using applications such as sales force automation, smart catalogs and electronic commerce.*

JBMS allows applications to "tear off" required information from the corporate database, manipulate it on a portable platform and deliver it back to the corporate database to update information, submit an order or customize a service. It can run on any platform that supports a Java Virtual Machine. A beta version is available now. The commercial version is slated for release early next year at $195 per developer.

© Cloudscape: (510) 873-0900

■ *The* **World Wide Web Consortium** *has announced a public draft of Cascading Style Sheets 2, which adds style to content to produce Web pages. The spec is available at www.w3.org/TR/WD-CSS2.*

Sybase seeks to regain top form

Chairman and CEO Kertzman is counting on new 'Net and Java products.

Q&A Mitchell Kertzman is a brave man. The Sybase, Inc. chairman and CEO took over the reins at the once high-flying database company in the summer of 1996, at a time when Sybase was losing millions and spiraling downward. But Kertzman's perseverance and Sybase's ability to deliver new 'Net-oriented products appears to be paying off: The company recently reported solid quarterly earnings and revenue — the kind of news Sybase watchers used to take for granted. Can Kertzman and Sybase keep it going? *Network World* Editor in Chief John Gallant attempted to find out during a recent interview with Kertzman.

What is Sybase doing to position its database software to support intranet and Internet applications?

Where I think the greatest demands are placed on our architecture and on our database is less in intranets, where you continue to have IT control over the environments, than in Internet applications. With the Internet, you are sharing data between internal transaction-oriented systems and external customer-oriented systems. In this case, IT loses control of the computing environment being used, and they lose the predictability of load and availability.

What we're doing to our database, in addition to increasing its reliability, availability, scalability and all those things [needed for intranets], is we have added some management tools that are unique. Nobody else has these kinds of tuning and management tools to prioritize classes of users, individual users, tasks and kinds of access. You can categorize usage in all kinds of ways and then set priorities to manage demands.

Where do you stand in delivering on your Java strategy?

As all of Java is, it's a work in rapid progress. We're probably furthest ahead in development tools, where we have our PowerJ, which is a second release now. Probably the next furthest along is the execution environment in the middle layer, which is our Jaguar component transaction server. It is shipping and executes JavaBeans. Perhaps the most exciting place we're doing Java work is where we're just about to ship a beta product, which is actually executing JavaBeans inside the database. And that will go into beta in November in its first pass with Adaptive Server.

And that gives customers the ability to do what?

It gives customers the ability to develop components — in this case, JavaBeans — and have them execute at any level of the application architecture. With Java, it could run on the client, middle layer or inside the database. But the most interesting thing is in the development area.

In this new component-based world that's securely in Java, you can develop components and deploy them at any level of the application architecture and debug them using, let's say, our PowerJ tool.

Given the role Java plays in your strategy, are you concerned about this war going on between Microsoft Corp. and Sun Microsystems, Inc.?

Yes, in the sense that as a Java licensee, part of the reason we signed up was the promise of "write-once, run-anywhere" technology. Given that we're living with and complying with those terms, we think that all licensees should. We believe that what Microsoft is doing is in the least creating a fear, uncertainty and doubt environment around Java that's very much in Microsoft's interests.

On the other hand, a lot of the conflict is around Java in the client and browser. We think the impact of Java is going to be much more in the middle layer, database and the server than on the client. The client is a Windows environment. That fight is over. So this notion of Java purity on the desktop is less important.

If you had Bill Gates here now, what would you say to him?

My advice would be that he should be thinking more of his customers and less of himself.

And if Sun's Scott McNealy were in the room, what would you say to him?

I'd probably say to him that we support his efforts. Sun is not only defending its interests [by suing Microsoft], but is defending the interests of the whole Java licensee community.

What do you think Sybase's image is today?

We have put to rest the viability questions. I don't hear people asking if Sybase is going to be around. Those are the questions that are asked about Informix these days. But those questions were being asked about us a year and a half ago.

I think the image is of a company on the rebound. The image is once again becoming the image of a technology company, that we are pushing the edges of technology like what we're doing with Java. And we're getting more of an image of an enterprise company, meaning that our support services and everything else that we do is at that level of high availability.

What are the key things you need to do to restore confidence in Sybase?

We need to get revenue growth going to finish the turnaround. I consider the turnaround essentially to have had three major steps. The first is restoring consistent profitability to answer the viability questions and to have customers feel secure doing business with Sybase.

The second was while we were doing that, to completely refresh the technology and bring high-performance, advanced technology products and a complete architecture to the market. So we've done those first two. And now what we'd better do is resume growth. We're particularly focused on what we think is the most important sign of the health of our company, which is server license revenue growth.

You've been around the high-tech industry for a while. Is it possible for a company that stumbles to become No. 1 in new industry segments?

Sure. Oracle did it. It's a little harder to do now with Microsoft in the market. And we don't believe that we're likely to be No. 1 in databases anytime in the reasonable future. That's not even a goal.

I think being a strong No. 2 is a good position for Sybase, and we'll work at that. We have generally been acknowledged to be in a leadership position in development tools and in middleware. And even during our most difficult times, we never really lost those market positions. ■

BorderWare Firewall gets more secure

Version 5.0 of Secure Computing's Unix-based software promises less-expensive remote access.

By Andy Eddy
St. Paul, Minn.

Secure Computing Corp. has a trademarked catch phrase, "Nobody Comes Close." And if Secure has its way, it will make sure that the only people who come close to a corporate network are end users with access rights.

With the latest release of its Unix-based firewall software, BorderWare Firewall Server 5.0, Secure has added major features that ensure remote staff will have the ability to access all corners of the enterprise network, while still offering solid protection from undesirable intrusions.

The primary augmentation comes through the integration of iPass, Inc. server technology, which enables authenticated connections — a "private encrypted tunnel" in Secure's words — to the network from a remote location. Through iPass licensing agreements with various Internet service providers, BorderWare enables local dial-ups through more than 1,300 local access points in 150 countries. This, combined with the ability to employ dynamic IP addresses, shrinks the normally high costs of remote access.

Administration *of Secure's BorderWare Firewall Server 5.0 is simple, yet feature-filled.*

Rather than the long-distance costs generally required for traveling employees to link to the network, BorderWare provides the means for remote users to safely create a dynamic virtual private network (VPN) connection via the Internet.

Encryption is facilitated through the use of client-side software that supports IPSecurity, a standard that enables companies to add stronger security, such as Secure's own SafeWord authentication server.

Easy administration

On the administration side, BorderWare offers a comfortable graphical interface for simple installation and configuration. Reports providing data on usage and connections can be presented as an on-screen display, saved to a file, printed out or e-mailed to a specified address.

"You don't have to be a Unix expert to use BorderWare," said Andrew Stevens, BorderWare's product manager. "It's Java-based, which means you can administrate the product from any browser, even across the Internet, on any platform."

Secure plans to make BorderWare Firewall Server 5.0 available this month at two prices, $6,000 for a 50-user license and $13,000 for a licence for unlimited users. Both packages include the VPN option with two remote-access clients. If a company already has a maintenance contract for BorderWare Firewall Server with Secure, upgrades are free.

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'NET INSIDER

Who *are* you anyway?

Once upon a time you could tell something about text by the company it kept.

If the text was in a respected newspaper or a referred technical journal, it was seen as responsible and authoritative. The reputation of the paper produced an assumption of review and control.

On the other hand, if the text was on a flyer handed to you on the street, you might not be inclined to give it quite the same respect.

But what do you do with text on the Internet? How can you tell if it is even worth taking the time to read?

It might not be if it is from any one of a number of people that frequently post to some of the Internet mailing lists. It is not just that the postings may be unpleasant to read, because many are, but that what these people say may have no basis in fact.

How do you know if the information you come across is factual? This is not just an Internet problem, but the low cost of entry to Internet-based publishing makes the problem more prevalent here.

I'm not as worried about the "a being in a UFO gave me and Elvis a pedicure" type of thing one sees next to supermarket checkouts. These are generally easy to dismiss by people with a modicum of awareness of any real world. I'm more worried about text that purports to be about technical topics.

This is not just a problem of identification. It can be difficult to gurantee that the text you are reading actually came from the person that it purports to come from, but I'm more worried about the credentials of the individual. What gives this person the knowledge to write on the topic?

I can assume that an article in a reffered medical journal will have been submitted for some sort of peer review to people who have a recognized background in the topic. That is not an assumption I can make if I see an article posted on the 'Net.

Scott Bradner

Judgment days

Looking back on the technical discussions on some of the Internet Engineering Task Force-related mailing lists, it is easy to find many cases of people — some with the best of intentions but hampered by a severe clue shortage — pronouncing judgment on the correctnessof one or another technical proposal. They're also not shy about offering their own solution to some great problem. Figuring out which proposals or which comments come from people who have the knowledge and background to know what they are talking about can be time consuming.

The Internet makes publication easy. Someone with 10 years in the field can publish proposals alongside someone else with 10 days' experience. Differentiating between them takes time, wastes resources and can derail worthwhile proposals. Establishing the credentials of the authors of materials on the Internet is going to become an ever more serious problem, whether the text is about archaeology, astronomy or Internet technology.

Disclaimer: Harvard is about the ultimate in a peer review environment — just ask any junior professor. But the above are my ponderings.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

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Technology Update

Covering: Evolving Technologies and Standards

NETWORK HELP DESK

Ron Nutter, a Master Certified Novell Engineer and Groupware CNE in the Lexington, Ky., area, tracks down the answers to your questions. Call (800) 622-1108, Ext. 7476, or send your questions to rnutter@world.std.com.

I have recently been put in charge of a Windows NT network with 25 machines. I don't have any documentation, none of the ports are labeled and no cabling blueprints exist. Is labeling the ports sufficient, or do I need to document the entire network? What's the best tool for this?

Via NWFusion

Labeling the ports would be just one step. You also should use a tool such as Visio Corp.'s Visio to help build a detailed drawing of what workstation comes into which hub port. Label each of the outlets with the word "Data" followed by a number. I've used a Brother labeling machine for this task for several years, and I recommend you use it or something similar. Label the cable that plugs into the hub for each workstation with the same label.

Putting this information into a Visio drawing and filing it in a network documentation book would be a good start. The book also should include a page on each machine. It's a good idea to number each machine or have a unique way of referring to the machine that is separate from the user. Record the type of machine, speed of processor, amount of memory, type of network card and size of the hard drive. Also note which types of software are installed locally and if any shares come from a workstation rather than the server.

Assuming that not all your workstations are the same model with the same configurations, I strongly suggest you run Rdisk from the command prompt at each machine as soon as possible. This will build a recovery disk that can help recover a machine without having to restore from a backup tape or, worse, reinstalling. If you have one or more NT Servers on the network, run Rdisk with the /S option. This will back up additional information such as user account data.

Lastly, get a copy of Symantec Corp.'s Norton Utilities for NT. It will help guard against problems.

Wending through the quality-of-service maze

By Rick Forberg

Increasingly, quality of service (QoS) is held out as the defining feature of next-generation networks.

QoS is capable of delivering real-time multimedia applications, eliminating congestion for business-critical applications and improving bandwidth efficiencies. Today, there is evidence of customers reaping exactly these benefits using networks based on ATM. So, the logic goes, the lack of ATM to the desktop explains the lack of widespread deployment of QoS.

This has lead to excitement over the prospects of packet-based QoS mechanisms that will work end-to-end. But the full evolution to next-generation networks with end-to-end QoS will not be easy or quick — whether they are based on ATM or not. Understanding this requires sifting through a flurry of new terminology and emerging stan- dards and returning to simple business logic.

First, the term QoS often is confused with the more fundamental idea of class of service (CoS). QoS, as the name would imply, simply means the quality — good or bad — of the service delivered. It covers qualities such as the percentage of data lost, maximum end-to-end delay and maximum delay variation (or jitter). In ATM networks, where these concepts are well developed, the ability to negotiate QoS parameters and reserve bandwidth depends upon the CoS selected.

ATM standards

ATM Forum standards are in place to allow switched virtual connections to be requested (using User-to-Network Interface 4.0), routed (using Private Network-to-Network Interface Phase 1) and controlled (using Traffic Management 4.0). The bandwidth and service quality delivered reflects what is needed.

Commercial implementations of the latest ATM standards are starting to appear. Earlier ATM standards and implementations were not as comprehensive regarding QoS, but did address essential CoS distinctions.

The same basic approach is being taken within the Internet Engineering Task Force's (IETF) Integrated Services working group for QoS in IP environments. In this working group, two CoS' are taking shape — Controlled Load Service and Guaranteed Service. As conceived in current drafts, the first of these is most similar to ATM's nonreal-time variable bit rate (VBR) service; the second is most similar to ATM's real-time VBR. The latter provides some guarantee on maximum net delay, but neither IETF CoS addresses jitter.

The means for signaling CoS/QoS requirements and reserving bandwidth in IP nets is being addressed in the IETF's Resource Reservation Protocol (RSVP) working group. Because IP is a connectionless protocol, the new service classes apply to flows of IP traffic. A flow is specified in RSVP by the destination IP address and the type of transport protocol, such as TCP, contained in the IP packet. It also may be qualified by a logical destination port or application identifier in the transport protocol header.

Entered onto the proposed standards track this summer, RSVP is designed for multicast and unicast flows. Given its multicast orientation, RSVP requires an end system receiving a flow to initiate the CoS/QoS request and send it to the routers and end systems upstream, where the flow originates. RSVP by itself, however, is powerless to deliver on CoS/QoS requests, like an airline reservation system without an airline.

The ability to deliver CoS/QoS in packet networks depends on having network equipment, such as end systems, switches and routers, that are capable of distinguishing different flows, such as file transfer vs. real-time voice or video. The network equipment then must classify each flow and place each class in a separate queue for transmission or processing with appropriate priority. Many LAN switches today are incapable of doing this and cannot support RSVP. Traditional routers, while capable, suffer significant performance loss when attempting all these tasks, which often defeats the purpose. Even the I/O subsystems of today's PCs and servers are not optimized to behave this way.

However, this is the easy part of the problem to solve. Some new Application Specific Integrated Circuit-based Layer 3 switches can be purchased with these capabilities built-in and can perform these tasks at wirespeeds. In addition, the IEEE is working on new standards for Layer 2 switches, such as 802.1q and 802.1p, to provide a new tag in the Layer 2 header.

Three bits of the new tag will indicate priority or service class, while the other portion will indicate virtual LAN. This will allow up to eight service classes on switched Ethernet at 10M, 100M or 1000M bit/sec and other LAN equipment. The key here is a simple standard means for Layer 2 switches to distinguish the incoming traffic classes — assuming it has been appropriately tagged upstream. Coordination with the IETF's emerging service classes and RSVP is being addressed by the IETF's Integrated Service over Specific Link Layers working group. Straightforwarding mapping is expected, which means LAN switching equipment must be capable of interpreting 802.1q and 802.1p and must support multiple priority queues. Most LAN devices do not have these capabilities.

End systems also must be upgraded with new software, or in some cases, new hardware. That is the easy part. The difficulty is realizing that enabling any form of higher priority CoS creates complex management and control issues that span the entire network. This means supporting admission control logic end-to-end across the network to prevent more bandwidth from being reserved than is available on any link at Layer 2 and Layer 3. It also means policing mechanisms to prevent "cheaters" from using more high-priority service than was agreed to.

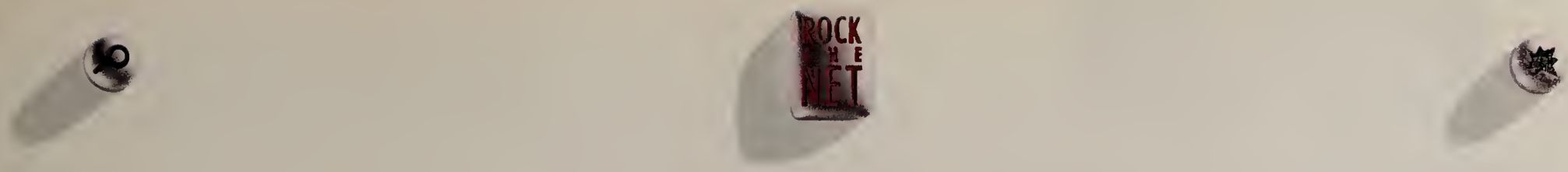
Forberg is product manager of ATM Internetworking at 3Com Corp. He can be reached at (408) 764-5000.

UP CLOSE

ATM service categories

The main goal behind ATM service categories is to adapt the high-speed technology to a wide range of applications. Multiple service types also help ease net congestion and guarantee data delivery.

Service category	What it does	Application
Unspecified bit rate (UBR)	Specifies "best effort" delivery but does not specify traffic service guarantees.	Remote access or telecommuting
Available bit rate (ABR)	Allows devices to change the rate at which they send data according to a number of parameters, such as congestion.	LAN interconnection
Constant bit rate (CBR)	Defines guaranteed rate to transport services.	Video distribution or voice
Real-time variable bit rate (rt-VBR)	Handles applications that require minimal delay.	Compressed audio, interactive multimedia
Nonreal-time variable bit rate (nrt-VBR)	Handles bursty traffic.	Transaction processing



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EDITORIAL *insights*

The FCC at a crossroads

The Federal Communications Commission is the key to the success of telecommunications reform, the catalyst that can spur new competition in the local loop and long-distance markets. It is the linchpin in the complex regulatory machinery that governs how quickly — or how slowly — new services reach businesses and consumers.

There's just one problem: The linchpin is broken.

As we examine in a special investigative series beginning this week, a variety of problems keeps the FCC from making telecom reform a reality. Among other things, the federal agency handles a staggering workload with too little money and too few people — a problem compounded by growing turnover among key personnel. Its overly complex rulemakings are continually being slammed in court, and the agency is battling with state regulators over who should set the terms and conditions for competition.

These problems are keeping the U.S. telecommunications industry from realizing its vast potential, and they threaten to hold back the development of electronic commerce and the economy.

Our series was timed to coincide with the departure of FCC Chairman Reed Hundt and the ascension of new Chairman William Kennard. Hundt loved the limelight, but he had little success solving the fundamental problems that keep the agency from fulfilling its mission.

While garnering acclaim for filling federal coffers through the FCC's own spectrum auctions, Hundt was unable or unwilling to really examine how the FCC works and remove the many obstacles it has placed in its path. He also expanded the agency's role — pushing, for example, an overly broad social agenda with universal service — at a time when the FCC can't handle the job it already has.

Kennard takes over the FCC at a crossroads. He has the opportunity to bring a fresh perspective and a new way of doing business. He'd be wise to start by streamlining the agency's decision-making processes, cutting paperwork and figuring out why the FCC's regulations keep getting knocked around in court. He needs to extend an olive branch to state regulators and find ways that the states and feds can work together to speed competition. What's more, Kennard must somehow reduce the influence lobbyists have in the regulatory process.

That's a tall order for anyone. But if Kennard chooses to simply continue business as usual, the FCC will fall further behind. The federal court system will assume more and more control over the regulatory process as litigious and well-funded telecom companies squabble over every issue. Worse, the U.S. network industry will slip as other nations deal with reform in a more streamlined and intelligent fashion.

John Gallant, editor in chief jgallant@nww.com

Network Management • Jeff Paschke & Jeff Kaplan

New tools aren't curing performance management woes

In 1995, International Network Services (INS) conducted an industry survey that confirmed the difficulties users were having optimizing the performance of their enterprise networks. At the time, many of these problems stemmed from the lack of tools to monitor and measure the day-to-day network performance Today, despite the introduction of myriad new products and tools to address this issue, INS' latest research shows many users continue to struggle to adequately manage network performance.

Network performance management has become increasingly important as users expand their networks to handle intranets/extranets, electronic commerce and other new business applications. This continual expansion and day-to-day firefighting have left net administrators with little time to proactively manage network performance. And INS' research ironically has found that the wealth of new products and tools only has compounded these issues.

These products typically require one or more dedicated people to custom configure, install and maintain them on an ongoing basis. At a time when network organizations are expected to do more with less, dedicating personnel to network performance management is a luxury. Furthermore, 40% of survey respondents report they are dissatisfied with their network performance management capabilities.

Real network performance management should accomplish three main objectives. First, it should improve service to end users and customers. Effective performance management helps you to proactively identify and reduce network resource bottlenecks and optimize net performance, thereby increasing the quality of service provided to end users and customers. Unfortunately, 53% of survey respondents indicate they are dissatisfied with their current ability to establish and maintain network performance service-level agreements (SLA). Less than 25% have SLAs in place.

Second, net performance management should improve capacity planning. Understanding historical network utilization and availability trends helps you anticipate new network infrastructure requirements. Yet only half of the survey respondents report they are performing WAN capacity planning, 46% are doing LAN capacity planning, and only a third are performing server capacity planning.

Finally, network performance management should maximize productivity and minimize costs. It should generate the data necessary to help you identify key problem areas and make the right staffing assignments so the network support staff can respond more quickly and work more effectively.

More than 40% of the survey respondents indicate they have three or more people dedicated to network performance management. In light of many users' high level of dissatisfaction with their network performance management capabilities, it is doubtful they are seeing meaningful productivity improvements.

INS' survey results make it easy to see why nearly half of the participants report that justifying the costs and benefits of network performance management technology to senior management remains their biggest obstacle to improving network performance. As one respondent put it, "It is hard to make people understand the impact that good network management can have."

This research demonstrates that vendors must go further to fill the functional gaps in their network performance management products.

More importantly, vendors also should provide real-world expertise to help users match their technical requirements with their business needs and then deploy the technology to optimize the performance of their enterprise networks.

Paschke is a principal consultant and Kaplan is director of strategic marketing at International Network Services, a Sunnyvale, Calif.-based network services company. They can be reached at jeff_paschke@ins.com and jeff_kaplan@ins.com. The full results of the survey are available at www.ins.com/surveys.

Send letters to nwnews@nww.com or John Gallant, editor in chief, Network World, 161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification.

More advice to Reno

Regarding Mark Gibbs' column "Dea Ms. Reno: A letter from the Gibbs Institute" (Oct. 27, page 75):

Gibbs should step out of his ivory tower and indulge in a little reality with those of use who have to actually purchas stuff. While the Department of Justice focuses its inquiry on, of all things, a stupid Web browser, Microsoft has indulged in plenty of anticompetitive practices tha could use some scrutiny.

For instance, my PC vendor insists that it must bundle some Microsoft garbage — either Office97, which my company doesn't use, or some home software that we have no use for whatsoever — wit

Microsoft and security: You're on your own

Microsoft says it gives users the features they want. Microsoft also says it provides security. Both statements offend me.

I believe Microsoft gives users only those features that are reasonably easy to integrate and help expand Microsoft's endless hegemony. Why else would Gates & Co. risk a $1 million-per-day fine and the endless penetrating scrutiny and wrath of the Department of Justice by bundling Windows 95 with Internet Explorer and allegedly forcing computer manufacturers to purchase both from Microsoft as a package or take none at all?

Redmond says the seamless desktop will allow users to concentrate on creativity without having to worry whether they're in Word, Excel or another application. But if this public relations spin had any substance, we'd see a lot less lip service and more utility, such as security.

Users are crying out for reasonable levels of security. They want to harden their electronic shells from penetration by hackers and spies, yet the predominant marketing and distribution force in the universe is ignoring their pleas.

Microsoft, of course, says its NT operating system was designed to meet government security specifications. But do not for a minute think NT security will help you. In fact, it will hurt you, because believing NT is inherently secure provides a false sense of well-being. Here are a few things to keep in mind:

- NT meets the lowest possible federal specification for security, known as C2. No security professional believes C2 offers any useful security protection and you shouldn't either.
- The C2 specification and accreditation for NT is valid only up to the point in which the NT machine in question is connected to another computer. You read that right. C2 originally was written in 1983 and assumes that a secure computer resides in a physically locked room. It also assumes the computer is not connected to another one. That was the security level Microsoft chose.
- NT is the most hackable operating system around today. Newsgroups and listservs on the 'Net publicize NT hackers' results. International cadres of hackers are dedicated to finding every vulnerability and security hole in every nook and cranny of NT. Some do it for the chase. Some do it because they like security. Some do it because they hate Microsoft.
- Microsoft can barely spell security. Two of my staffers recently took the Microsoft Certified Software Engineer course. When I asked them about the security aspects of the course, they told me only the most cursory security principles were discussed, and only after they had pressed the issue. "It's not part of the curriculum," was the pat answer.
- NT offers no cryptographic protection of information or other sensitive operating system files. Instead, Microsoft suggests users do their own.

So with NT, you're on your own if security has any place in your organization's plans. Here are a few tips to get you on the right track:

- Consider removing very sensitive files from the NT box. If they're that sensitive, why are you putting them on a network?
- Don't connect machines that don't need to be connected. Connecting NT machines immediately downgrades their security. Air gaps make the best firewalls.
- Shut off as many services as you can. Use only those that are required to do the functions you specify. Enforce anonymous File Transfer Protocol connections.
- Consider splitting services on multiple machines. If you try to do too many functions on a single server, you will have to open more services, and that can increase security weaknesses.
- Monitor the 'Net, including my site, www.infowar.com, for security alerts about NT. Listen to them closely. They are probably right. It takes Microsoft a dose of public-relations Prozac to admit there's a problem. Don't believe its spin doctoring.
- Apply all known patches to sew up NT holes. Apply all service packs and fixes.
- You're in a networked environment, so order machines without floppy drives or disable them as boot drives.
- Apply password filters to prevent crummy passwords. Do not permit any services to allow clear text logons.

It's time for Microsoft to do some serious listening to customers and implement some real security. No, Bill, it won't be easy. But building up a $40 billion fortune took some effort, too. Now all we ask is that you return the favor and give us a little protection.

Schwartau is chief operating officer of Security Experts, Inc., an information security consulting firm in Seminole, Fla., and president of infowar.com. He can be reached at winn@securityexperts.com or winn@infowar.com.

MARTY BRAUN

mputers. Why? Because its licensing agreement with Microsoft says so. In these days of senior management screaming over every nickel and dime we spend, it's hard to stomach this kind of waste. In any case, it's irritating to have to purchase unneeded, second-rate products because your vendors' supplier can ram this stuff down their — and by extension, our — throats.
Erik Carlseen
IT manager
California Multimodal, Inc.
Chula Vista, Calif.

Mark Gibbs' letter to Janet Reno is way off. I work with the general public on software issues daily and can tell you most of them don't know squat about computers. If they order a PC and it comes bundled with software, they are going to use it. And why? Because it's easy and it's right there in front of them.

I think the Justice Department is doing a great job, but it should focus on the bigger picture and have Microsoft stop bundling its software with computers, period. This country is based on competition, and the rest of the industry should get a fair shake.
M. Tilton
Los Angeles

Mark Gibbs should ask himself this question: If Netscape were to disappear tomorrow, would Microsoft still consider Internet Explorer 4.0 an integral, free part of the Windows 95 experience? Or would it be a value-added application?

Internet Explorer 4.0 is bundled with Windows 95 not because it is required, but as an aggressive stance by Microsoft to gain market share at the expense of Netscape. That means Microsoft is using its operating system dominance to bolster its application market share, which in 1995, it agreed not to do. It is as simple as that.
Dave Steele
Staff engineer
Xetron Corp.
Cincinnati

Like most people, I don't want to see Microsoft or any other company abuse its position of power in the marketplace. But as Mark Gibbs put it so well, it is absurd to shackle the industry and, ultimately, end users by crippling Microsoft's ability to create and distribute innovative and affordable software.

The pricing model for computer software has changed dramatically in the consumers' favor. Microsoft certainly played a big part in that change, which, along with the equally dramatic reduction in hardware costs, has fueled the spread of the PC to all parts of large and small business as well as the home market.
Michael Stock
Vice president, information services
Pharmhouse Corp.
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REVIEW

DEDICATED ENCRYPTION DEVICES ARE THE BEST CHOICE OVERALL FOR SETTING UP ENCRYPTED VIRTUAL PRIVATE NETWORKS OVER THE INTERNET.

The best way to build a VPN

By Joel Snyder

Virtual private networks (VPN) are an increasingly popular option for communicating with employees or business partners over the Internet. The hard part is figuring out the best way to build one, given you've got at least four viable options.

What most vendors call a VPN amounts to encrypted TCP/IP links between LANs. You can fashion one using a software-only product, with software installed on a router or firewall, or with dedicated encryption hardware. We set out to discover which method works best for connecting two or more LANs.

After testing 11 products, we concluded that dedicated hardware encryptors are easiest to configure, manage and control. Unless you've got a lot of time, a small network, a tiny budget and limited reliability requirements, hardware tunnels are your best bet for LAN-to-LAN encryption. But don't worry: All the products behaved as expected, and none slipped clear traffic where it should have been encrypted, according to the protocol analyzer we used to check each one.

As for specific products, RedCreek Communications, Inc.'s Ravlin series stood out as a great all-purpose solution. With dedicated hardware, you get set-it-and-forget-it convenience as well as superior performance and the option to bring individual PCs scattered across the globe into the secure environment.

Radguard, Inc.'s cIPro systems let you construct a bulletproof installation where the highest level of security is required and link 100M bit/sec LANs with ease.

Budget-minded network managers will want to examine Microsoft Corp.'s Routing and Remote Access Service (RRAS), formerly code-named Steelhead. With zero cost for software and integration into the Windows NT 4.0 environment, RRAS brings low-cost encryption into small business environments.

Firewall-based tunnels

Most of the larger firewall vendors include a tunnel capability in their product. We picked two products, BorderWare Firewall Server from Secure Computing Corp. and Interceptor Firewall Appliance from Technologic, Inc., to represent the market.

The general idea behind firewall-based tunnels is that as long as you're funneling all your IP traffic through the firewall, you might as well encrypt there, too. This isn't as good an idea as it sounds.

We found little evidence that the firewall

Score Card

	Features and filtering (25%)	Manageability (25%)	Performance (25%)	Key management (15%)	Installation and documentation (10%)	Overall score
cIPro (Winner)	8 x .25 = 2.0	7 x .25 = 1.8	8 x .25 = 2.0	8 x .15 = 1.2	7 x .10 = 0.7	7.7
Ravlin 10	6 x .25 = 1.5	8 x .25 = 2.0	9 x .25 = 2.3	7 x .15 = 1.1	7 x .10 = 0.7	7.5
IOS	8 x .25 = 2.0	6 x .25 = 1.5	10 x .25 = 2.5	5 x .15 = 0.8	7 x .10 = 0.7	7.5
Permit /Gateway	7 x .25 = 1.8	8 x .25 = 2.0	6 x .25 = 1.5	8 x .15 = 1.2	7 x .10 = 0.7	7.2
InfoCrypt Enterprise	7 x .25 = 1.8	7 x .25 = 1.8	7 x .25 = 1.8	7 x .15 = 1.1	6 x .10 = 0.6	6.9
AltaVista Tunnel 97	5 x .25 = 1.3	8 x .25 = 2.0	NT	5 x .15 = 0.8	8 x .10 = 0.8	6.4
Interceptor	7 x .25 = 1.8	6 x .25 = 1.5	5 x .25 = 1.3	5 x .15 = 0.8	6 x .10 = 0.6	5.9
PN[7]	6 x .25 = 1.5	7 x .25 = 1.8	4 x .25 = 1.0	5 x .15 = 0.8	6 x .10 = 0.6	5.6
RRAS	6 x .25 = 1.5	6 x .25 = 1.5	NT	4 x .15 = 0.6	5 x .10 = 0.5	5.5
F-Secure VPN	6 x .25 = 1.5	4 x .25 = 1.0	NT	5 x .15 = 0.8	5 x .10 = 0.5	5.0
BorderWare	6 x .25 = 1.5	4 x .25 = 1.0	3 x .25 = 0.8	4 x .15 = 0.6	4 x .10 = 0.4	4.3

NT= not tested. For these products, overall score was calculated based on the other categories multiplied by a factor of 1.33.

Individual category scores are based on a scale of 1-10. **Percentages** are the weight given each category in determining the **total score.**

vendors have thought as much about IP tunneling as they have about building strong firewalls. The Java-based user interface and setup on Secure Computing's BorderWare was nothing short of frightening, and we had to battle poor documentation and convoluted procedures to use File Transfer Protocol (FTP) to transfer our keys around the network. We had hoped for better integration into the firewall and better distributed management.

Although Technologic's Interceptor was more reasonably priced and didn't force us to use FTP to move keys around, we still had to have a guru from the vendor dial in to our network to get the tunnels up. This, again, was the fault of poor documentation.

In both firewalls, we had the same misgivings about management style. The two end points of a tunnel inherently are part of a single management domain and require closely coordinated management and configuration.

Net Results

Product	General product description	Filtering capabilities	Certificate authority	On CA failure	Encryption supported
ciPro *Radguard, Inc.* *Starts at $7,000 per site; $7,000 for CA*	Two-port VPN; 10M/100M bit/sec. Token ring available. Dedicated hardware.	Block/pass/encrypt/clear using any bits in IP packet.	Dedicated hardware. X.509 RSA/Internet Secure Association Key Management Protocol (ISAKMP).	Runs forever.	Data Encryption Standard (DES)/Triple-DES. Rekey at specified interval or volume.
Ravlin 10 *RedCreek Communications, Inc.* *$1,300 (4M bit/sec); $3,500 (10M bit/sec)*	Two-port VPN; 4M and 10M bit/sec. Dedicated hardware.	Certain protocols only (Remote Authentication Dial-In User Service, Domain Name System, BOOTP, SNMP) can be blocked or passed in clear. Can block nonencrypted traffic.	Own on Windows 95 or NT. X.509/ISAKMP.	System runs until box reboots or new SA needed.	DES/Triple-DES (CFB64 and CBC). Rekey at specified interval.
IOS Software *Cisco Systems, Inc.* *$500 to $7,000 depending on hardware, plus Cisco router*	Software or hardware add-on to existing Cisco IOS (v11.2) to enable encryption.	Block/pass/encrypt using SA/DA/SP/DP/IP quality of service.	None	Does not apply.	DES-CFB64/CFB8; Rekey at specified interval.
Permit/Gate *TimeStep Corp.* *$5,800 per site; $5,750 for management software*	Two-port VPN. Dedicated hardware.	Block/pass/encrypt using SA/DA.	X.509-based CA on Windows 95 or NT.	System runs until box reboots or certificate expires.	DES
InfoCrypt Enterprise *Isolation Systems Ltd.* *$6,200 per site; $2,400 for manager; $2,400 for CA*	Two-port VPN; 100M bit/sec. Dedicated hardware.	Block/pass/encrypt using SA/DA/SP/DP.	Own on Windows 95 or NT.	System runs until certificate expires.	DES/Triple-DES. Rekey at specified interval.
AltaVista Tunnel 97 *Digital Equipment Corp.* *$995 per 50 users plus hardware*	Software-based IP routing encryptor/tunnel. Software for Windows NT, BSD/OS, FreeBSD and Digital Unix.	None explicit; some may be in host OS.	None	Does not apply.	RC4 56/128. Rekey every 30 minutes.
Interceptor *Technologic, Inc.* *$4,500 per site*	Firewall with integrated tunneling. Includes hardware.	Drop/pass/encrypt using SA/DA. With proxies, SA/DA/SP/DP/ToD.	None	Does not apply.	DES-CBC/DES-EDE-K3/RC2-40/RC4-40/Safer-128SK-CBC.
PN^7 *Unified Access Communications, Inc.* *$4,995 per site (2 port); $500 for management software*	Multiport VPN. Dedicated hardware.	Block/pass using SA/DA/SP/DP; block/pass others.	None	Does not apply.	DES/Triple-DES-CBC/RC2-112. Keys automatically tumbled every 30 minutes.
Routing and Remote Access Service *Microsoft Corp.* *Free; requires Windows NT Server 4.0*	Software-based IP and IPX routing add-on. Runs over Windows NT Server.	Block/pass using SA/DA/SP/DP/Internet Control Message Protocol type/IP protocol ID.	None	Does not apply.	RC4
F-Secure Virtual Private Network (VPN) *Data Fellows, Inc.* *$2,495 per site plus hardware*	Software-based IP routing encryptor/tunnel. Software based on embedded Unix OS.	Block/pass based on encryption.	None	Does not apply.	DES-CBC/Triple-DES/Idea/Blowfish. Rekey at specified interval.
BorderWare Firewall Server *Secure Computing Corp.* *$6,000 to $13,000 per site plus hardware*	Firewall with integrated tunneling.	Block/pass using SA/DA.	None	Does not apply.	DES-CBC/Triple-DES-CBC/RC4-40/RC4-128.

For a discussion of whether the products will support upcoming encryption standards and how encryption can impair overall LAN performance, see Network World Fusion.

www.nwfusion.com

In both firewalls, tunnel configuration had to be manually repeated and coordinated at each end of the tunnel, an error-prone and cumbersome process.

But even if they had good documentation and a better user interface, firewall-based tunnels still wouldn't pay off because the performance of the firewalls was poor (see comparison graphic, page 58). BorderWare, running on a 200-MHz Pentium, clocked in as the slowest of any product we tested at 1.6M bit/sec. Interceptor, on a 166-MHz Pentium, was an uninspiring 2.2M bit/sec. In both cases, no other firewall activity, such as proxies or filters, was occurring.

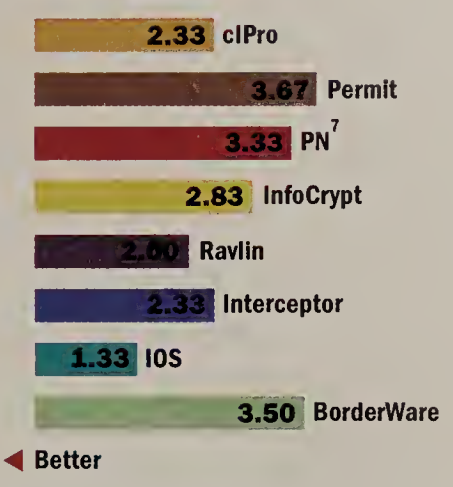
Tunneling using your firewall is a workable solution only in limited circumstances involving small networks, small volumes of data and fairly static configurations. For everyone else, there are better solutions with lower total cost, better security and higher performance.

Router-based tunnels

If firewalls are reasonably obvious places to put tunnels, then routers are blindingly so. Routers already have to look at and process every packet that leaves the LAN — why not give them the burden of encrypting as well?

We looked at Cisco Systems, Inc.'s IOS-based encryption option as an example of router-based tunneling and were impressed by its performance and flexibility. Cisco was the only vendor offering true VPN features other than IP encryption in their product RRAS. Those features include encapsulated AppleTalk, VINES IP, Connectionless Network Protocol, DECnet, IP and IPX. (Microsoft's RRAS can encapsulate IPX as well as IP too.)

LATENCY INTRODUCED



Numbers are multiples of the latency of control configuration, which ran without VPN hardware.

Cisco's encryption technology allows you to specify any stream of encapsulated or pure IP traffic for encrypted tunneling. The tunnel is built based on source and destination address, TCP/User Datagram Protocol (UDP) port numbers and IP Quality of Service indication.

For users of existing IOS-based routers, encryption can be added-in software for a license fee ranging from $500 to $7,000. For higher performance, Cisco's Encryption Service Adapter (ESA) board provides a coprocessor-based encryption engine that blew the socks off of everything else we tested.

Like all of Cisco's equipment, the management interface to VPN and encryption features is a command line. We used the off-the-shelf documentation to configure and test tunnels and encryption in less than an hour.

Like all the high-end encryption devices, Cisco's ESA is both tamper-resistant and tamper-

detecting. This means just removing the card from the router — even when powered off — turns on the "tamper" light and requires management intervention. You either have to know a special password that was entered when the card was first initialized to reenable it or you have to be willing to clear the memory on the ESA board. If you're so bold as to remove the cover from the card, a dead-man switch initializes the memory for you. And if you get the cover off, you can't reverse-engineer the board — half of it is encased in epoxy.

This kind of security feature separates the devices that are serious security tunnels from those that are simply designed to keep your traffic over the Internet private.

Although router-based tunneling suffers from the same potential drawbacks as firewall-based tunneling, we're more enthusiastic about Cisco's implementation. Hardware encryption assist can alleviate performance problems, and the relatively low cost to add encryption and more powerful VPN features make it an attractive option.

Software tunnels

We looked at three software tunnel systems. The first two, AltaVista Tunnel 97 from Digital Equipment Corp. and RRAS from Microsoft, run on standard operating systems such as Windows NT or Unix. The third, F-Secure Virtual Private Network (VPN) from Data Fellows, Inc., has its own embedded operating system.

Digital and Microsoft offerings are easy to evaluate and classify. They bring encrypted TCP/IP into the corporate LAN environment using just software. Digital's AltaVista Tunnel supports LAN-to-LAN and client-to-LAN tunnels on Windows NT, BSD/OS, FreeBSD, and Digital Unix systems. Microsoft's RRAS offers the same features but only runs on Windows NT 4.0. In both cases, the tunneling software requires the server to act as a TCP/IP router, receiving encrypted packets, decrypting them and retransmitting them to their final destination.

Both RRAS and AltaVista Tunnel are appealing to network managers with tight budgets. AltaVista Tunnel starts at $1,000, while Microsoft's RRAS is a free update to NT 4.0. But we found these software products only work well for small networks with lightly loaded servers. They're more appropriate for serving remote PC users (client-to-LAN) than remote LANs.

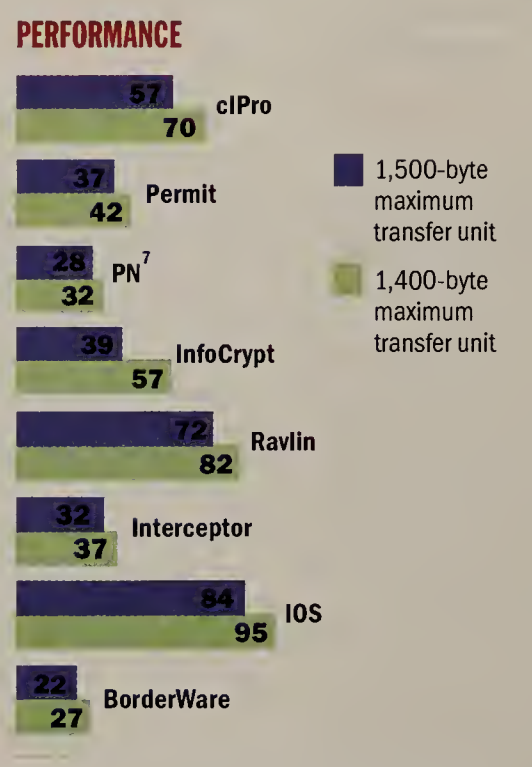
RRAS is more sophisticated than AltaVista Tunnel. It adds a midlevel router into Windows NT, complete with Routing Information Protocol and Open Shortest Path First routing protocols and firewall-style traffic filtering rules.

Both of these products are excellent ways to get some experience with tunneling. They can run on existing servers and share resources with them. For low traffic levels and particularly for client-to-LAN connections, these are good starting points.

Data Fellows' F-Secure VPN has an unusual architecture. It consists of a Windows 95/NT-based graphical user interface (GUI), which is used to generate a network of encrypting tunnel systems. F-Secure VPN then builds boot diskettes for Intel Corp.-based systems that let them run as dedicated VPN systems.

This approach is a hybrid between software- and hardware-based tunnel systems. Unfortunately, it blends the disadvantages of both: The difficulty, expense and cost of being a hardware integrator are shoved onto the network manager. Meanwhile, the benefits of a software-based system, such as the ability to share resources and reduce costs, are missing. F-Secure VPN costs $2,500 and takes over the hardware as surely as any dedicated system.

F-Secure VPN may appeal mostly to network managers at educational institutions, where the availability of cheap labor and Data Fellows' 50% discount make the headaches of using this approach economical.



Numbers are percentages of performance compared with control configuration, which ran without VPN hardware.

Site-to-site or site-to-user?

There are two ways to build secure TCP/IP tunnels: at the LAN level and at the end system level. In this review, we concentrated on LAN-level tunneling.

LAN-level tunnels typically are transparent to workstations. In a LAN-level tunnel, the workstation sends IP packets out in the clear. The encryptor, which links the LAN to the rest of the world, picks up the packets and scrambles them, and a decryptor at the other end unscrambles them for transmission to the server.

The advantage of LAN-level encryption (usually called LAN-to-LAN) is that it's transparent to users and under the control of the network manager, who can ensure that corporate security policy is being followed. The disadvantage is that packets are available in the clear on the corporate LAN, which may not be secure enough for certain confidential data.

End system-level encryption happens on the sending workstation or server itself: The packets are never seen in the clear because they're encrypted before they hit the wire. Two variations on this are client-to-client, where the two end systems encrypt and no one sees the packets in the clear, and client-to-LAN, where the client cooperates with a system at the destination LAN.

In a dedicated access environment, such as a corporate LAN, client-to-client and client-to-LAN encryption is rare. Client-to-LAN is difficult to manage, install, and slows performance. In a dial-up environment, such as general Internet access, end-system encryption is the rule since the Internet service provider generally can't be trusted to encrypt and tunnel the packets.

These two styles are often mixed: The same tunnel hardware that handles LAN-to-LAN encryption usually can also handle client-to-LAN tunnels.

— Joel Snyder

Hardware tunnels

We looked at five hardware-based tunneling products: TimeStep Corp.'s Permit/Gate, Unified Access Communications' (UAC) PN^7, Radguard's cIPro, RedCreek's Ravlin and Isolation Systems Ltd.'s InfoCrypt Enterprise.

In their simplest configurations, hardware tunnels operate as encrypting bridges and are typically placed just ahead of the network's routers. They fit into existing TCP/IP networks and intercept traffic as it heads off the net for encryption or filtering.

The beauty of this approach is that existing workstations and routers do not need to know anything about the tunnel or even be reconfigured to learn about it. The tunnel is, for all intents and purposes, invisible. In fact, the report from the protocol analyzer we placed between the tunnels was the only way we knew packets were being encrypted.

Small, unintrusive and generally managed from a single workstation, hardware-based tunnels were surprisingly easy to install and use. Compared with all other categories, these took the least amount of effort.

Management of hardware tunnels actually is two tasks: key management via a certificate authority (CA) and system management. All of the hardware tunnels except PN^7 (whose management software won't run under Windows 95) can be managed with GUI software run-

ning under Windows 95 or NT. The system management software is used to handle basic tunnel security — which packets to encrypt — and how to handle errors. Hardware tunnel management can be centralized, which means one interface is used to manage all the tunnels, and the management software is responsible for updating the hardware to adhere to the centralized management policy.

CAs are a little different. For most of the tunnels, the CA runs as an application on Windows. Radguard's cIPro was a big exception: It had an additional piece of dedicated hardware that was responsible for key management. More important, each box has its own internal knowledge of the network keys, which means that even if the CA is dead, the network keeps running. This seems like an excellent idea. Having a vital network security application running on Windows doesn't give us the same warm fuzzy feeling that running the same application on dedicated hardware does.

Some hardware tunnels refuse to operate if the CA is unavailable. For example, the Permit Security Gateway won't come up from a system boot if its network management application can't be reached. Other tunnels had similar difficulties (see Net Results table, page 56).

Hardware tunnels also differ in their flexibility. A good tunnel will allow you to choose which traffic to encrypt, which to send in the clear and which to simply block. The best in this area was Radguard's cIPro, which lets you pick source and destination addresses, ports and protocols as well as any set of bits in the IP packet as filtering criteria.

Although we tested tunnels in LAN-to-LAN configurations, some vendors also support client-to-LAN tunneling using the same hardware (see story, page 58). This is an obvious benefit if you're looking for a unified tunneling solution. Isolation Systems, RedCreek and Timestep all have Windows-based software available for client-to-LAN tunneling.

We also were pleased to see some vendors have multiple hardware tunnel offerings that let remote sites buy relatively less expensive hardware while the central site bulks up. Timestep, RedCreek and Radguard all have less expensive dedicated hardware that interoperates with the high-end tunnels we tested. Radguard and Isolation Systems also offered 100M bit/sec LAN connections; Radguard even has a token-ring connection available.

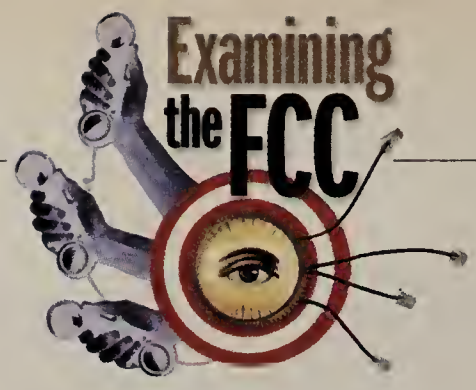
Hardware tunnels, by and large, were not traffic bottlenecks, although none of them came close to Cisco's hardware-assisted encryption performance. In our tests, RedCreek's hardware, followed by Radguard's and Isolation Systems', topped the performance charts in their category. UAC's PN^7 lagged behind, despite the 200-MHz Pentium in our test unit.

Bottom line

In general, we liked hardware-based encryptors best. If you're serious about security, even in your own building, Radguard's cIPro is the way to go. Radguard is not just going through the motions; these folks really care about keeping things secure. For about half the price, though, RedCreek's systems outperform the cIPros and add client-to-LAN capabilities.

One special case worth mentioning: If you already have high-end Cisco routers, the ESA option is an excellent alternative. Speedy performance and the simplicity of dropping encryption into your existing infrastructure outbalance a difficult management interface.

Snyder is a senior partner at Opus One, in Tucson, Ariz. He can be reached via e-mail at jms@opus1.com.



Stuck in the middle

Continued from page 1

Critics blame the FCC. They see its rulings as heavy-handed, attempting to micromanage the telephone companies. In at least two important areas, the courts have agreed, overturning FCC rulings. In one case, it threw important pricing jurisdiction back to the states.

Meanwhile, FCC supporters cite the intransigence of the incumbent LECs and say the agency needs more resources if it is to make them comply with the telecom act.

Clearly, the task set out for the FCC in the Telecommunications Act of 1996 is formidable. And the agency's caseload has more than quadrupled since 1994, while staffing has leveled off.

Does the FCC have the resources, direction and vision it needs to lead the communications industry into the 21st century? Is the Telecommunications Act of 1996 fatally flawed? *Network World* set out to examine these issues, and the result is this three-part series that takes a close look at the FCC and the economic and political realities in which it must operate.

This first installment focuses on the resources the FCC has to get the job done. It looks at budget trends and the impact of staff and commissioner turnover, and considers whether the FCC's charter is simply too broad.

The second installment addresses politics and decision making. Is the telecom act too fraught with compromises and contradictions, making effective implementation impossible? Are the FCC's internal decision making processes outdated or otherwise flawed? And what influences are various special-interest groups able to exert on FCC policies?

We will conclude the series by offering suggestions for reform. Some changes clearly are in order if the intent of the telecom act — significant competition at all levels of telecommunications — is to be fully realized. Recommen-dations vary widely, but some key themes emerge: The FCC and state regulators should stop fighting over jurisdiction and work together to enforce interconnection agreements; legal remedies need to be streamlined so competition shifts from the courts to the marketplace; and rules must include sunset provisions that reveal the light at the end of the regulatory tunnel.

Too big or too small?

There is no doubt that the past 20 months have been demanding for FCC staff members. Observers express concern that burnout and turnover are becoming limiting factors.

As soon as the telecom act became law, the FCC had to come up with rules for implementing it. The scope of this project "made the breakup of AT&T in the 1980s pale in significance," says Alan Pearce, a former FCC staff member who is now president of Information Age Economics, Inc., a telecommunications consultancy in Washington, D.C.

The number of rulemakings the FCC makes in a year has gradually increased over the decades, from 10 to 20 during the 1930s and 1940s to about 50 in the 1980s and early 1990s. But Pearce counted some 150 that were generated in the 18 months following the passage of the telecom act. And staffing levels have declined since 1980.

Likewise, the number of cases filed with the FCC for review in official, or docketed, proceedings have skyrocketed from 16,776 in fiscal 1994 to an estimated 72,000 in fiscal 1997.

This more than fourfold increase would seem to make a good case for increased staffing and budget levels.

Instead, the FCC's head count is down slightly since 1995, from 2,112 full-time or equivalent employees in fiscal 1995 to an estimated 2,050 in fiscal 1997. In terms of the ratio of docketed proceedings per employee, that's a hike from about 10.5 proceedings per employee in 1995 to more than 35 in 1997, a jump of more than 300% in two years.

As for the budget, in the six years leading up to the Telecommunications Act of 1996, the FCC's budget grew at an unprecedented rate, increasing 86% from $99.6 million in fiscal 1989 to $185.2 million in fiscal 1995. The expansion was driven in part by the Cable Act of 1992, as well as a need to modernize the FCC, which had few computers and was still using rotary-dial telephones at the start of the 1990s.

But since 1995, the FCC's operating budget has grown only a fraction of a percent each year. In fiscal 1996, the FCC was allocated $185.7 million. Congress subsequently provided an additional $10 million for implementation of the new telecom act. The FCC used $7.2 million of these special funds in fiscal 1996, and carried the remaining $2.8 million over to the next year (see graphic, page 66).

According to several current and former staff members, the FCC has been able to deal with the increased burden with seemingly insufficient staff and budget by implementing office automation, using smaller teams and devising methods that enable people to handle many more items in the same amount of time.

Electronic filing of forms and applications has reduced processing time by at least 25%, and in some cases, it has lowered it from weeks or months to overnight. This has enabled the FCC to cut its administrative branch almost in half over the past several years and focus resources more on policy tasks.

"They have much more sophisticated technology than we did when I was there," says former FCC Common Carrier Bureau Chief Cheryl Tritt, who now heads up the telecommunications law practice at Morrison & Foerster in Washington, D.C.

Still, the caseload numbers look somewhat daunting. Some of the companies filing cases say the FCC is creating the problem itself by micromanaging the regulatory process to an increasing extent.

"Since the telecom act passed, the FCC has been regulating more and regulating in far greater detail than ever before," says Robert Blau, vice president of regulatory affairs at BellSouth Corp. "So the caseload is basically self-created and not a beast that Congress should feed."

Blau points to the petition BellSouth filed with the FCC on Sept. 30 in an effort to get into the long-distance market in South Carolina. The document is 19,000 pages and forms a stack 7 feet high.

"That's what had to be filed to respond to all the requirements that have come out of the FCC's interpretation of Section 271 ["Special Provisions Concerning Bell Operating Companies"] of the act," Blau says. "The commission keeps adding to its checklist and has gotten down into the nth level of detail, with each of the 14 points having many subpoints. This is creating a lot of paperwork that is time-consuming and expensive for both the government and industry."

Robert Blau, vice president of regulatory affairs at BellSouth, says the FCC's heavy caseload "is basically self-created and not a beast that Congress should feed" with additional funding.

To be sure, the FCC did meet the deadlines Congress imposed on it with the Telecommunications Act of 1996. The interconnection order — the biggest and single most important set of rules, which established rules for local competition — had to be completed in six months. In earlier years, it wasn't unusual for the FCC to take several years to complete this rulemaking process.

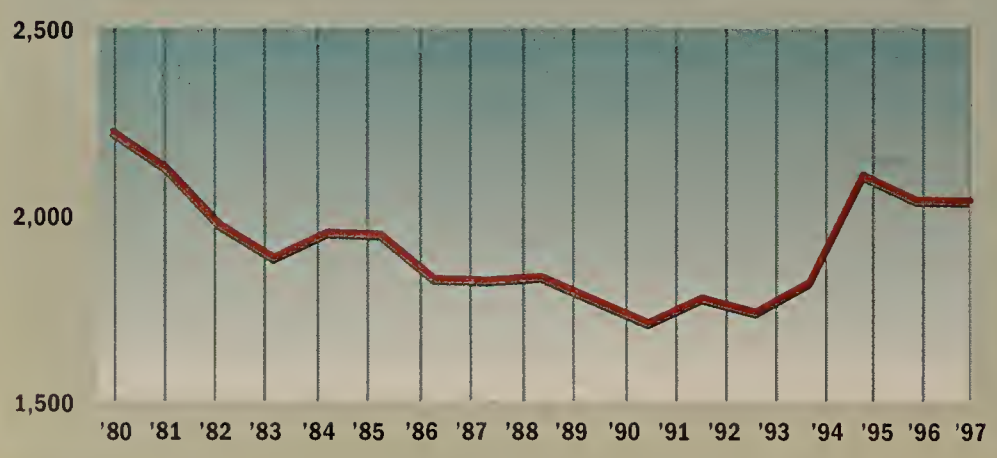
"We were always outmanned, always outgunned, but we beat every deadline Congress gave us," says Blair Levin, who last month resigned as FCC chief of staff.

Whether they were effective remains to be seen. Every major FCC rule is being challenged in court. Two different portions of the interconnection order — one outlining pricing provisions and the other mandating that regional bell operating companies (RBOC) must sell packages of local services to competing carriers —— have been overturned by the 8th U.S. Circuit

FCC STAFFING LEVEL

Even though the Telecommunications Act of 1996 significantly increased the FCC's burden, its staffing level remained flat.

All years are fiscal years; numbers are for full-time or equivalent people.



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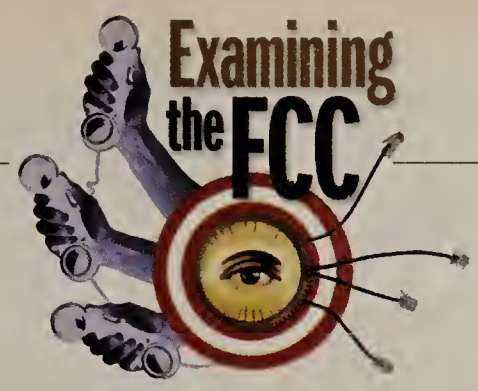


Let that spectrum free

The spectrum auctions that began in 1994 immediately turned the Federal Communications Commission into a profit center for the U.S. Department of the Treasury. They raised nearly $12 billion — more than the total amount the FCC has spent since its inception in 1934.

The experiment has been a big financial success despite the disappointing Wireless Communications Service (WCS) auction and the ongoing embarrassment of the C-block personal communications services (PCS) defaults. But the bottom line, however welcome, is just a side benefit. The main point is to get spectrum into the hands of enterprising people who will turn it into an economic asset.

"The commission has pushed more spectrum out into the market in the past three years, and in a more flexible fashion, than in any other three-year period in its history," says Peter Pitsch, a former FCC chief of staff who now is president of Pitsch Communications in Washington, D.C. "The auctions are an efficient way to get spectrum out so it can benefit consumers and business. People forget what a fiasco the previous lotteries and comparative hearings were."

According to Robert Pepper, head of the FCC's Plans and Policies division, the traditional comparative hearings process took an average of 48 months to turn spectrum into something useful. These hearings, often referred to as "beauty contests," were criticized for favoring large entities with political pull.

"Even the lotteries took 14 months because speculators who had no intention of building anything turned around and sold the spectrum for profit," Pepper says. "With the auctions, it took about four months to get licenses out and [get] people to invest in and build on them."

Despite the overall success of the auction process, some economists say the FCC is still not getting spectrum into use quickly or cheaply enough. They point out that spectrum is not a nonrenewable resource such as oil reserves and every minute that it is not being put to use represents wealth that is lost forever.

"The opportunity costs of delay and restriction are just too great," says Thomas Hazlett, a professor of agricultural and resource economics at the University of California, Davis. Addressing a Cato Institute conference on telecommunications deregulation in Washington, D.C. in September, Hazlett advocated abolishing the FCC and letting a spectrum disbursement system evolve under common law.

"In economic terms, spectrum is an input, not an output. So the cheaper it is, the more the public benefits," Hazlett said.

Tom Duesterberg, a senior fellow at the Hudson Institute in Washington, says Congress is blinded to this economic fact because it is determined to "use spectrum auctions to solve budget problems." The FCC should be instituting policies that drive spectrum prices down, not up, and get a lot more of it in use, he adds.

— *Susan Breidenbach*

Court of Appeals. The FCC's only recourse is the U.S. Supreme Court, which hears only a tiny fraction of the cases it gets.

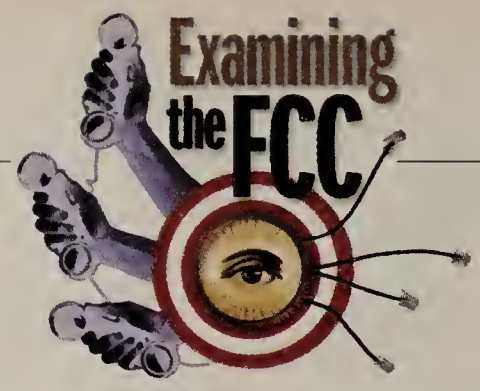
New roles

As if the increased caseload wasn't enough, Congress also broadened the FCC's responsibilities in new directions through some of the provisions in the act. Despite the existence of extremely efficient capital markets in the U.S., the agency found itself acting as banker for the C-block personal communications services licensees.

The move into high finance was an experiment FCC officials aren't likely to repeat in any subsequent spectrum auctions (see story, page 61). However, the broad expansion of universal service to include subsidies for schools and rural health care facilities is casting the agency in the roles of education reformer and social worker.

Some observers say the FCC is exhibiting way too much enthusiasm for these new pursuits. According to Rep. Billy Tauzin (R-La.), the FCC has interpreted the universal-service language in the telecom act as a power to tax and operate as a grant agency for education and health care programs. "That's not the intent of the people who wrote the bill," Tauzin says. He chairs the House Commerce Committee's subcommittee on telecommunications, which drafted the telecom act.

Similarly, Sen. John McCain (R-Ariz.), chairman of the Senate commerce committee, recently told the U.S. Telephone



FCC NEWCOMERS

The four new FCC commissioners are viewed as "an unusually able group of people," says Scott Blake Harris, a former chief of the FCC's international bureau who now practices telecommunications law at Gibson, Dunn & Crutcher in Washington, D.C. Unlike their predecessors, "all have dealt with common carrier concerns before," he says.

Democrat William Kennard, who last week was confirmed to replace Reed Hundt as chairman, has been FCC general counsel since 1993. In that capacity, he raised the FCC's win ratio in the appellate courts considerably, despite losing the battle over pricing jurisdiction to the state regulatory agencies and incumbent local carriers in the 8th U.S. Circuit Court of Appeals.

Kennard is expected to back procompetition policies for telecom reform and take a stronger stand on the First Amendment than his predecessor. He also may be more sympathetic to the large telcos because he used to represent them in his law practice.

Democrat Susan Ness: The lone incumbent commissioner

Republican Harold Furchtgott-Roth (not pictured) is the only non-lawyer in the group. As chief economist for the House Commerce Committee, he helped draft the telecom act. An advocate of market-based solutions, he reportedly — and ironically, given the FCC's role in broadcast regulation — doesn't own a television.

Democrat Gloria Tristani is a state regulator known for her anti-RBOC stance. She fought US WEST, Inc. over phone rates in New Mexico and expanded the state's powers to fine companies that were not in compliance with regulations. She also is familiar with issues involving rural telephone companies.

Tristani could make an interesting swing vote because she has her eye on the New Mexico governor's office — she dropped out of the 1998 race after being appointed to the FCC — and is likely to back the states in any jurisdictional disputes.

Republican Michael Powell was chief of staff for the Justice Department's antitrust division, where he approved the recent merger between SBC Communications, Inc. and Pacific Telesis Group. Regarded as a moderate, he is the son of retired Gen. Colin Powell, former chairman of the Joint Chiefs of Staff.

Association that he has "growing concern" about the time and effort the FCC is spending on developing "excruciatingly intricate econometric models" for collecting and distributing universal-service funds.

The fear is that these intricacies — as well as a growing group of special interests clamoring for their share — will spin the universal service fund out of control and sap increasingly more of the FCC's resources in the future.

"As technology evolves and the market brings forth new business models, how much fiddling is it going to take to keep this complex money-laundering machine in balance?" asks Bill Frezza, a general partner with Adams Capital Management in Pittsburgh.

Suicide mission?

Deregulation ultimately should lead to a reduced role for the FCC, but the level of resources needed for the transition period — and the length of that period — are matters of considerable debate. Hundt often refers to "a slimmer, smarter Commission" but says enforcement responsibilities will prevent the FCC from shrinking for some time to come.

The interexchange carrier community agrees with him and says the FCC needs more troops to bring the RBOCs to heel. The act gives the FCC the authority to fine companies for noncompliance, for example, but this power has not been exercised to date.

"We would like to see some enforcement with teeth," says Andy Lipman, an attorney for Jackson, Miss.-based WorldCom, Inc. "Until then, the Bell companies are going to continue to drag their feet. This is a time of maximum supervision; we almost need a U.N. peacekeeping force to patrol during this transition from monopoly to competition."

However, some want this transition period to be followed by a definite endgame.

"If I were the FCC chairman, I would try to put the place on a five-year going-out-of-business track," says Peter Pitsch, a former FCC chief of staff who is now president of Pitsch Communications in Washington, D.C. "It may be that in the first year or two, you need more resources than ever to get started.

"But the most important thing is not how big or small the FCC is; it's the opportunity cost of what they do or don't do," he says. For example, subsidy reform in the long-distance market during the 1980s pushed the price of long-distance service down about 40% at a time when prices in general rose 9%.

"That meant billions of dollars of efficiency gains for the U.S. economy," Pitsch says. Similar gains can be realized by fostering significant competition in the local-access market or getting additional spectrum into entrepreneurial hands as quickly and as cheaply as possible. The added tax revenue from the resulting business expansion would "fund the FCC in perpetuity," Pitsch adds.

Hedge against budget cuts

If more resources are, in fact, needed for the transition period, Congress shouldn't have too much trouble justifying them. These days, the FCC is one of the few government agencies that brings in a lot more money than it spends.

Regulatory and processing fees brought in $169.3 million in fiscal 1996 and offset most of the FCC's total budget. And since 1994, the FCC's spectrum auctions have generated approximately $12 billion for the U.S. Treasury. This is far more than the FCC has spent in its entire existence.

New blood

Critics hope the incoming commissioners will be able to take a fresh look at some of the problems plaguing the implementation of the telecom act. In an unprecedented turnover, four of the five seats are being filled by new members this fall, with Democrat Susan Ness the only holdover.

The Senate confirmed four new commissioners just two weeks ago: Democrats William Kennard and Gloria Tristani and Republicans Michael Powell and Harold Furchtgott-Roth. Unlike their predecessors, they all bring some telecommunications experience to the job (see story, at left).

However, none of the nominees come from the network industry. Three of the four are lawyers, as are most of the members of the FCC's senior staff. There is no core of information science experts who have real-world experience applying computer and network technology to business problems.

"A lot of these people are straight out of law school and have never even had a job before," says Charles Ferguson, cofounder of Vermeer Technologies, Inc., an Internet software company that last year was acquired by Microsoft Corp. "They come to the FCC to get their ticket punched so they can get jobs as expert witnesses or lawyers for telecommunications companies."

As a visiting scholar at the Massachusetts Institute of Technology, Ferguson recently completed an extensive study, "The Internet, Economic Growth, and Telecommunications Policy."

"In the absence of substantial industrial or technical understanding, analyses done by the FCC staff tend to be highly simplistic and miss important questions," Ferguson says. These problems are exacerbated by the fact that, despite recent improvements, the FCC continues to be poorly computerized. There is inadequate data collection and little information available electronically.

"As a consequence, there is within the FCC a general ignorance of modern information technology that is astounding, even at senior policy-making levels," Ferguson says.

Find more info on Network World Fusion, including:

- **"The Internet, Economic Growth, and Telecommunications Policy," a white paper in which MIT visiting scholar Charles Ferguson argues for changes in federal policy in order to promote competition**
- **The FCC's site, which includes pages that detail the various ways in which the agency is trying to meet the goals of the telecom act**
- **The Benton Foundation's Telecommunications Act of 1996 Homepage, which includes a good summary of the act's goals and the role of various players in making them reality**

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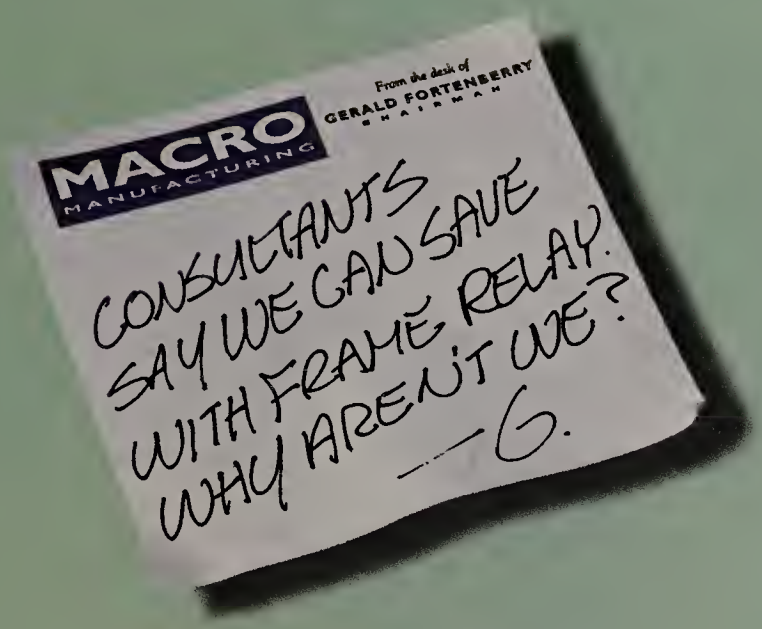

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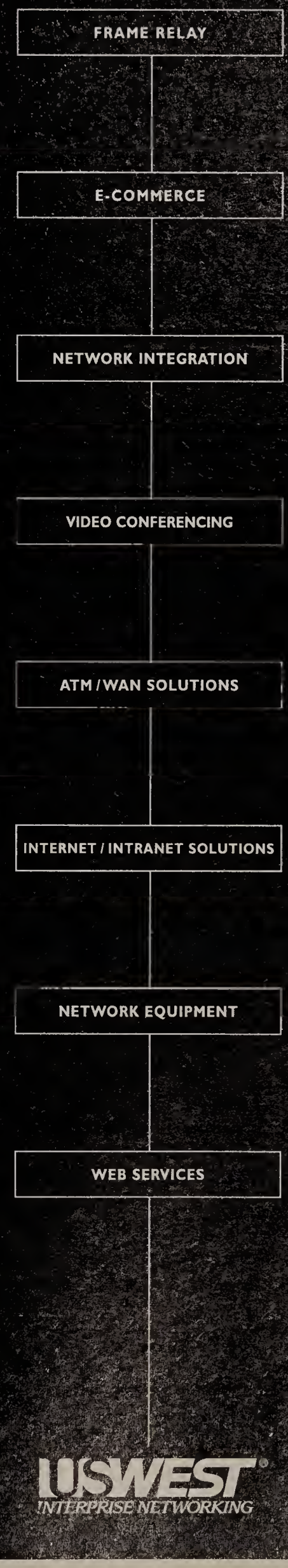

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*Source: Dataquest (A Gartner Group Company)

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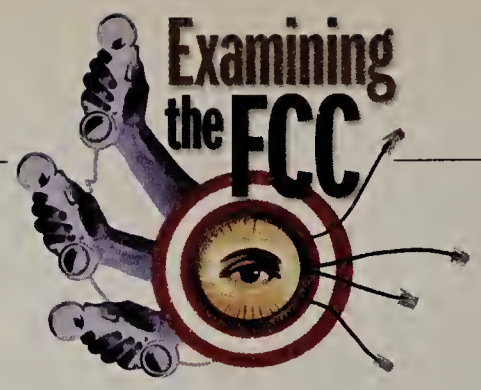


Temporary help

The FCC does get its pick of the top law school graduates each year, even though those lawyers could make twice as much money elsewhere. Telecommunications law these days is one of the hottest legal specialties, and new lawyers view the FCC as a springboard to other opportunities.

It's a temporary arrangement, but the FCC gets the benefit of their considerable talent, energy and fresh perspective for several years. And the recruits get broader experience and more responsibility than they would at a big law firm.

"They are given the ball and allowed to run with it," the FCC's Levin says. "The issues we deal with here are great, the place is very exciting, and it's a whole lot of fun."

Washington's law firms and consulting groups are full of FCC alumni who give the experience high marks. "Spending time at the commission is a fabulous education," says Robert Corn-Revere, a partner at Hogan & Hartson LLP and a former FCC chief counsel.

However, nothing takes the place of experience or continuity, and these days there seems to be too little of both at the FCC. Up through the 1970s, FCC re-cruits tended to be career bureaucrats who wanted to dedicate their lives to public service. But those days are gone.

"An organization like the FCC functions best when there is some institutional memory and technical expertise that has developed in-house," says Jim Blaszak, a partner at Levine, Blaszak, Block, and Boothby in Washington, D.C. and a legal assistant to the FCC's Common Carrier Bureau chief in the 1970s.

A revolving door strips away this foundation and leaves staff members to reinvent numerous wheels and repeat mistakes. For example, the problematic unbundling provisions in the FCC's 1996 interconnection order basically are a continuation of a number of extensive interconnection proceedings the FCC conducted in previous years. However, the commissioners and their staff appeared to be attacking the unbundling issue entirely from scratch.

"We'd been through all this before," Blaszak says. "They were asking the wrong questions."

Blaszak says the FCC does its best to retain employees, but the government pay scale is just too low. Salaries range from about $38,000 for lawyers fresh out of school to about $98,000 for the most senior staffers. Bureau chiefs and commissioners make about $120,000 per year.

According to Blaszak and Pearce, during the past 20 years there also has been an unfortunate tendency for political leaders to demean the contributions of career government employees.

Revolving doors in regulatory agencies swing both ways. For example, Larry Strickling, hired in September to head the FCC's new enforcement task force, was formerly vice president of public policy at Ameritech Corp. When people move back and forth between an industry and the agency that regulates it, the process can lead to a phenomenon called regulatory capture.

"The now-defunct Civil Aeronautics Board was captured by the main air carriers of the day, and they used it to quash competition," says Tom Bell, director of telecommunications studies at the Cato Institute, a Washington, D.C., think tank. No one suggests this has already happened at the FCC or that Strickling is an incumbent LEC mole, but many think the agency is at serious risk if the high turnover continues.

Ameritech and other incumbent LECs are at the head of a huge pack of special interest groups that hound the FCC on a daily basis, attempting to influence telecommunications policy.

Next week, in part two of this series, we'll shift the focus to politics and decision making processes. We'll also consider the merits of the telecom act itself and take a look at the various factions that try to sway the FCC implementation efforts.

Breidenbach is a consultant and freelance writer in San Mateo, Calif. She can be reached at sbreidenbach@usa.net.

FCC BUDGET AND CASELOAD HISTORY

The FCC's budget increased significantly in the early '90s, in large part to pay for long-overdue system upgrades. But since 1995, the budget has leveled off while the number of files to review for official, docketed, proceedings has skyrocketed.

	Budget (In millions)	Adjusted for inflation	Files for review
1970	$24	$101	N/A
1980	$76	$145	N/A
1990	$107	$130	N/A
1991	$116	$137	N/A
1992	$126	$144	N/A
1993	$140	$155	N/A
1994	$160	$172	16,776
1995	$185	$194	22,025
1996	$192	$197	38,304
1997	$191	$194 (September 1997)	72,000 (estimated)
1998	$219*	N/A	

* The 1998 budget was not final at press time. It includes $30 million in supplemental no-year funding to finance relocation of FCC headquarters.

SOURCE: FCC AND BUREAU OF LABOR STATISTICS

Rep. Tauzin sounds off

The telecommunications subcommittee chairman isn't happy with the FCC's progress thus far in implementing the telecom act.

Rep. Billy Tauzin (R-La.) is chairman of the House Commerce Committee's telecommunications subcommittee, which drafted the Telecommunications Act of 1996. In a recent interview, Tauzin shared his thoughts about telecommunications deregulation and the Federal Communications Commission.

What do you think of the Telecom Act's impact so far?

The implementation of the telecom act has been pitifully slow. The FCC's rulings are tied up in court, and the FCC is tied up in knots.

Why do you think there hasn't been more progress?

The FCC can't think of anything to do but regulate. Intrinsically, the FCC is a 1930s New Deal regulatory agency designed to protect consumers against monopoly. The first day a Bell company is allowed to enter the long-distance market and a long-distance company is allowed to enter the local loop — on that day, the FCC becomes irrelevant.

Who is supposed to have pricing jurisdiction, the FCC or the state regulatory agencies?

The states. The FCC is going against the clear language of the act and is trying to insist otherwise in spite of the court decision. The states wouldn't have accepted the act if it hadn't recognized their authority over local pricing. The FCC might not like this fact, but it's part of the agreement and the 8th Circuit [Court of Appeals] made that clear. The FCC missed some golden opportunities when they provoked this battle with the states.

What do you think of the FCC's universal-service order?

Universal service is a moving target. Is it still just a telephone or certain services that a telephone line can offer? The FCC has taken the universal-service language in the act and interpreted it as giving them the power to tax, to collect taxes, to turn into a grant agency in education. That's not the intent of the people who wrote the bill.

If you could revisit the telecom act, what changes would you make?

One of the major mistakes in the bill is that we didn't look at reorganizing and reinventing the FCC. We created a free-market policy, but we left the old monopoly agency in place and left it to them to deregulate. My plans are to get the new commission in place and sit down and talk to them about how to reinvent and restructure the agency.

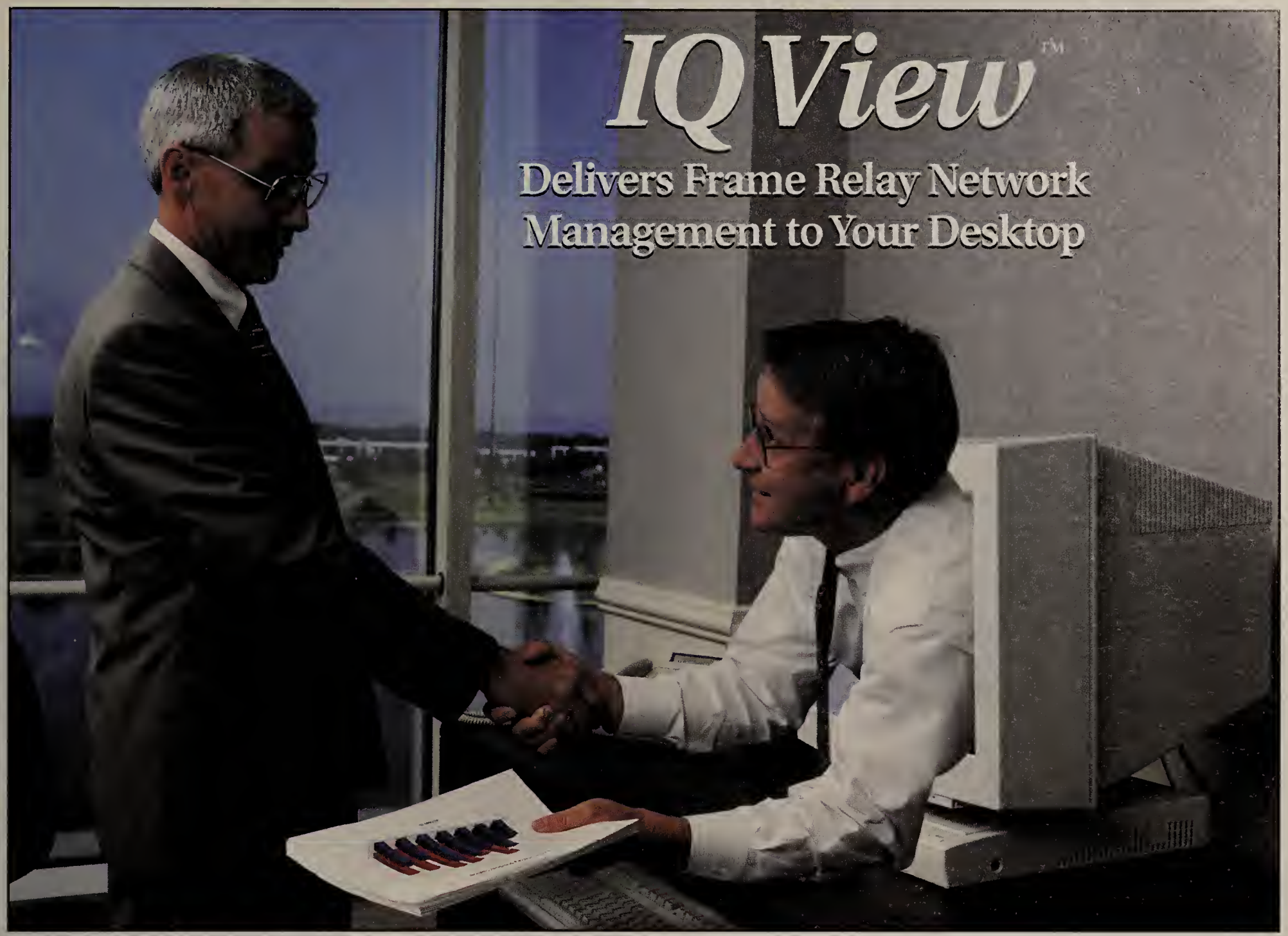
Is Congress likely to revisit the telecom act any time soon?

Reopening the act is not likely or a good option right now.

What else can you do then?

Well, we do budget and reauthorize the FCC. Maybe there are some things along those lines that we can do to make it clear we expect them to follow the law. We recognize the problems and want to get a read on the new commission. Hopefully, things can be fixed internally.

— *Susan Breidenbach*



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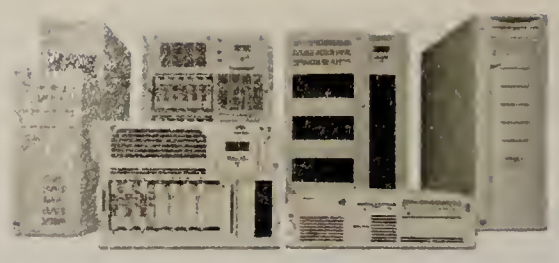

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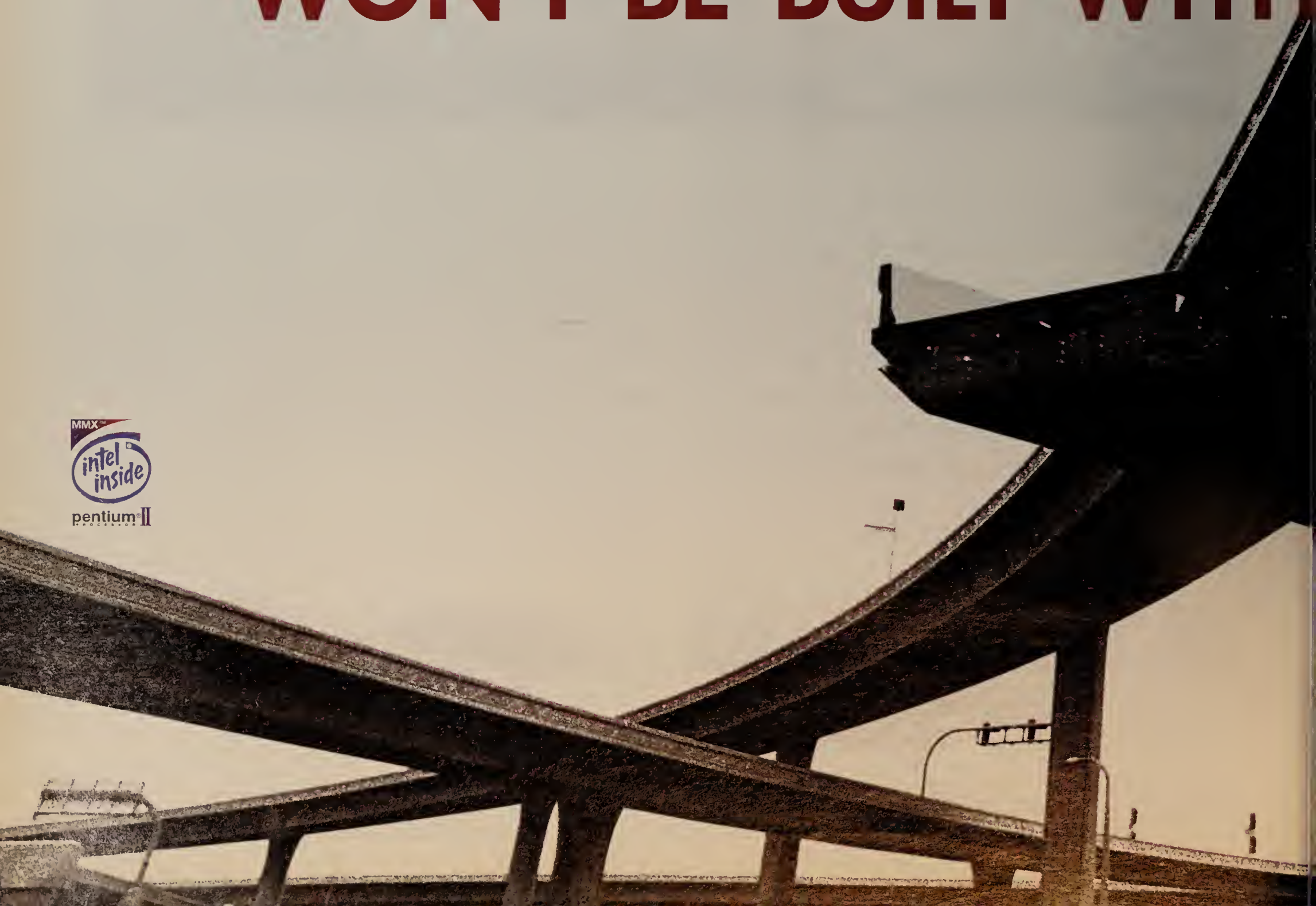

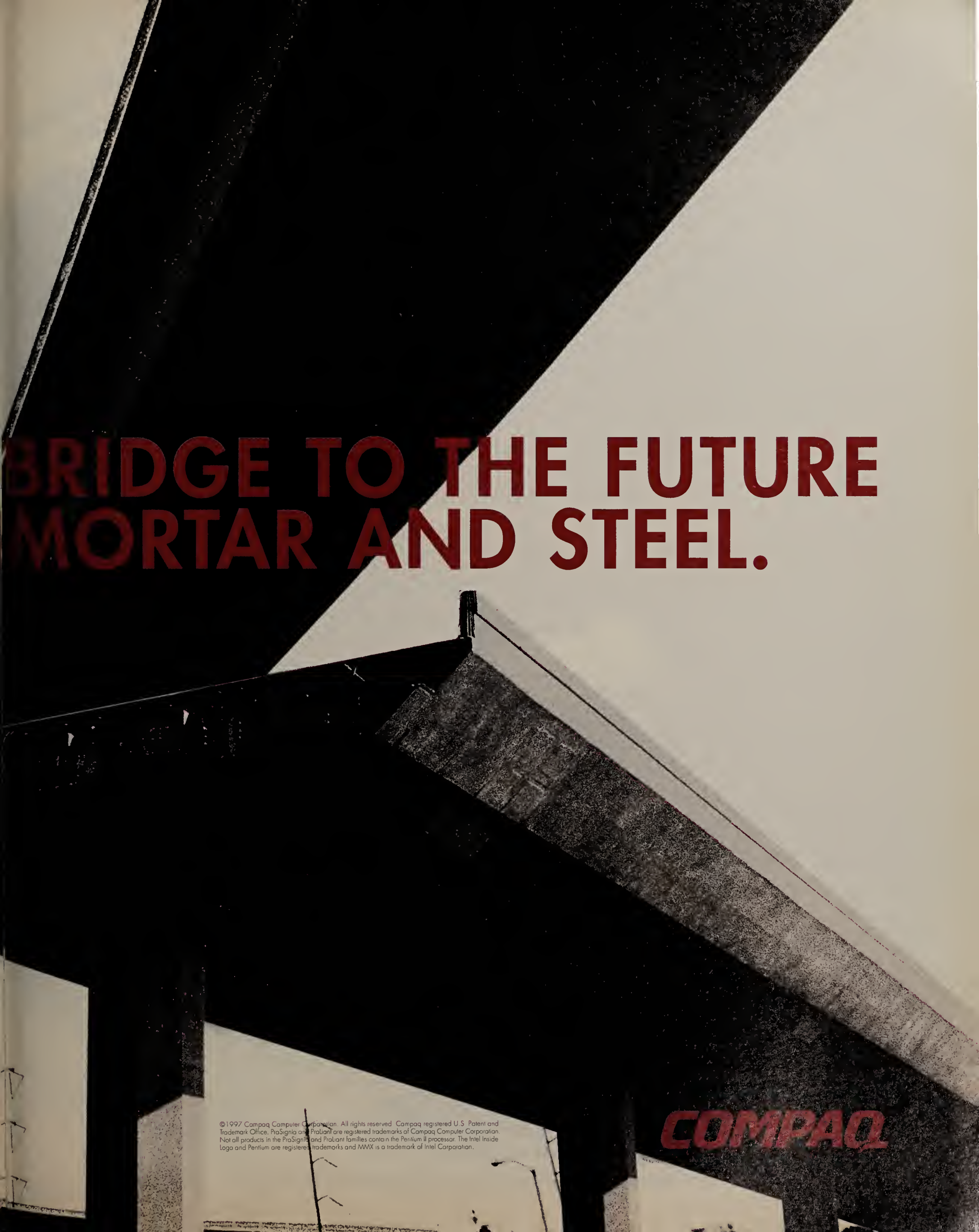

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Management Strategies

Seeing the LAN differently

A text-to-speech synthesizer helps a blind network manager run his NetWare LAN.

By Lauren Gibbons Paul

As if just being a network manager isn't tough enough, imagine having responsibility for a network of 40 PC users and not being able to see what you're doing.

Sam Rocco does it every day. Rocco, who lost his eyesight due to a hereditary disease at 9, is the network manager for the City of North York Transportation Department in Ontario. Adaptive or assistive technology lets Rocco carry on his daily duties, which include creating new network user accounts, installing hardware and software, supporting users and managing resources on the department's NetWare 3.11 LAN.

PHILLIPE LANDREVILLE

Sam Rocco *uses a screen reader to help him manage the City of North York Transportation Department's LAN.*

IBM's Screen Reader for OS/2 Warp 3, a text-to-speech synthesizer, is Rocco's primary enabler. In addition to a software component, the Screen Reader has two hardware pieces: Digital Equipment Corp.'s Talk Express synthesizer box and a separate IBM keypad. Rocco inputs a two-key command in order to read the current contents of his screen. A computerized voice — speaking at a rate that sounds like the speed of light to an unaccustomed ear — reads back the material.

Rocco rarely has to play back the information a second time, even when it's something as dry as a page from the installation documentation for the Corel Suite 7 package. "I usually get it the first time around," he says. Screen Reader supports a braille output device, but Rocco prefers speech output.

As is the case with most adaptive technology, Screen Reader is designed to be installed and maintained by the disabled worker.

"Easy installation and management are important because most network managers don't want to get involved with [adaptive technology]," says Dennis O'Brien, product manager for IBM Special Needs Systems, of Austin, Texas.

Rocco does not use any sophisticated network systems management tools to administer the modest network. Instead, he relies on the rudimentary network management functions in NetWare for emergency system alerts. Rocco is notified of system alerts the same way other network users are: The broadcast alert interrupts the users' work and is accompanied by a bell. Users who need help call Rocco or stop by his cubicle. He can solve any problem related to the file server from his desk, or he can go to users' cubicles and rely on their eyes to tell him what went wrong. He then has the users execute the right steps to fix the problem.

The biggest obstacle Rocco confronts in his job is the near-omnipresence of graphics that have no text equivalent. Prior to the graphics explosion, his screen reader could handle nearly everything he encountered on the Internet and elsewhere. Now he cannot access roughly 20% of the material on the 'Net because it lacks text-based links, he says. He often wastes a lot of time double-clicking on all available icons to see if they're the ones he needs.

"There are a lot of pages that are strictly graphics. I can't deal with those. It's very frustrating," Rocco says. He has been with the department for nine years but worries that if the trend continues, he will be able to do less of his job. For example, when he searches vendor Web sites for support information, he often is stymied in his attempts to find the help he needs for his users.

Getting back to work

These assistive technology tools aid disabled users.

Type of tool	Description	Vendor/product
Text-to-speech synthesizer	Translates text into a computerized voice	IBM, IBM Screen Reader
Voice recognition software	Translates speech into text	Dragon Systems, Dragon Naturally Speaking; IBM, IBM VoiceType
Voice browser	Interactive voice response system	NetPhonic Communications, Web-On-Call
Eye-tracking software	Tracks eye movements to navigate through applications	LC Technologies, Eyegaze System
Augmentative communication device	Communication device for people who cannot speak	Sentient Systems, DigiVox

Go online for more information about adaptive technology.

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"Every day it bothers me. I'm at a point already where I can't do certain things," Rocco says. The fear of losing his job is always on his mind.

Gibbons Paul is a freelance writer in Belmont, Mass. She can be contacted at laurenpaul@sprintmail.com.

Tips for designing disabled-friendly Web pages

If Dennis O'Brien has his way, Web page creators soon will stop and consider the page's accessibility to disabled users before they begin to program.

O'Brien, product manager for IBM Special Needs of Austin, Texas, is responsible for policing IBM intranet and Internet pages to ensure they have special features for physically impaired Web surfers. IBM employs one of the largest proportions of disabled people of any U.S. company, so it's important that its intranet pages are accessible, O'Brien says.

For example, using a function called "alt-text," developers can enter brief descriptions of graphical links so they can be read by a blind person's screen reader. "A Web designer has the choice of filling in the alt-text information or ignoring it. We're trying to make sure they don't ignore it," O'Brien says. For Web pages where sound is critical, another capability is to include closed captioning, so deaf users can access audio content.

The Web Accessibility Initiative of the World Wide Web Consortium, of which O'Brien is a member, will develop descriptive video and captioning enhancements to HTML and Extensible Markup Language, he says. The group also is working on extensions to cascading style sheets that will support speech output. The sooner companies adhere to accessibility guidelines, the better, O'Brien says. "Many accessibility functions can be incorporated cheaply if you think about them ahead of time. But they're expensive to retrofit."

—Lauren Gibbons Paul

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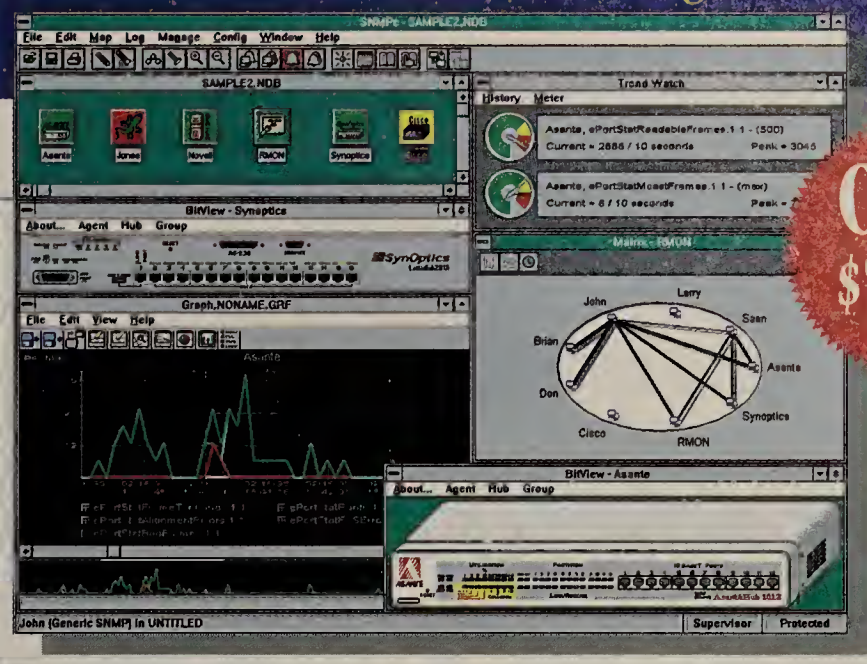

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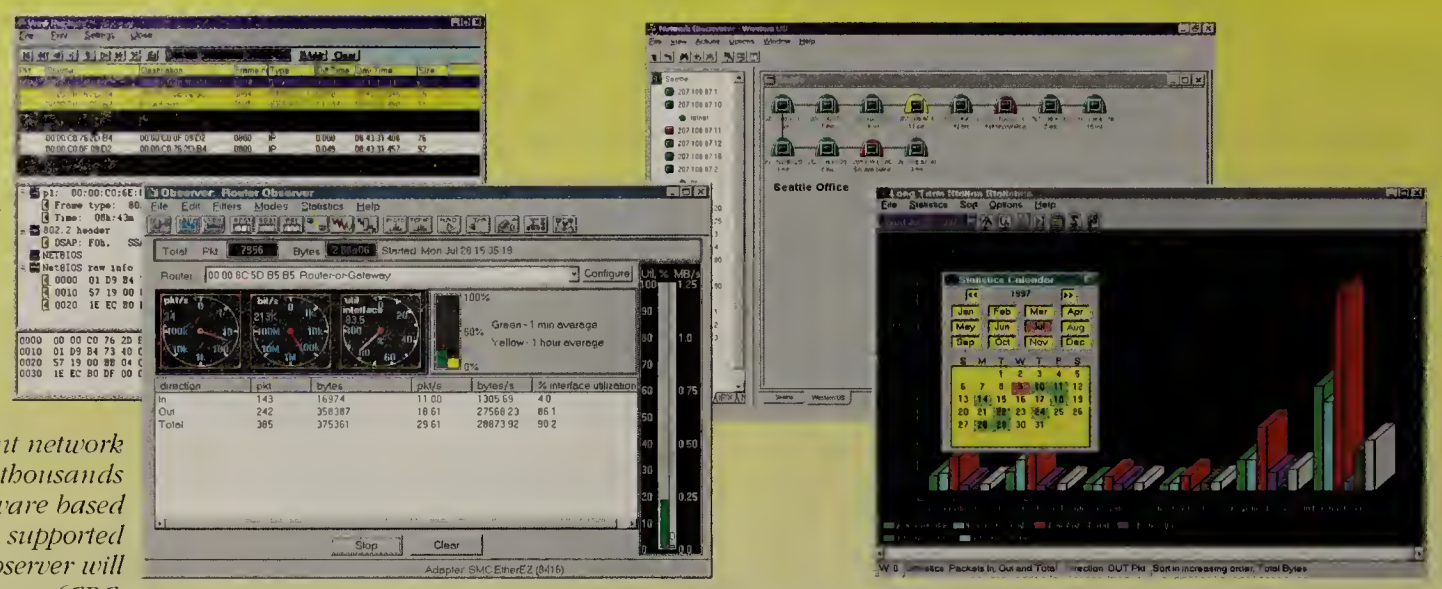

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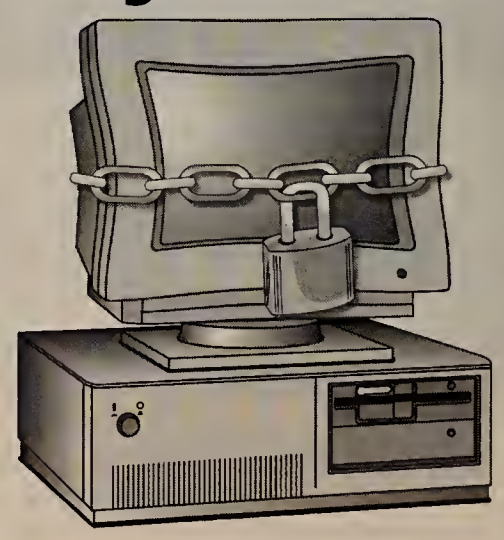

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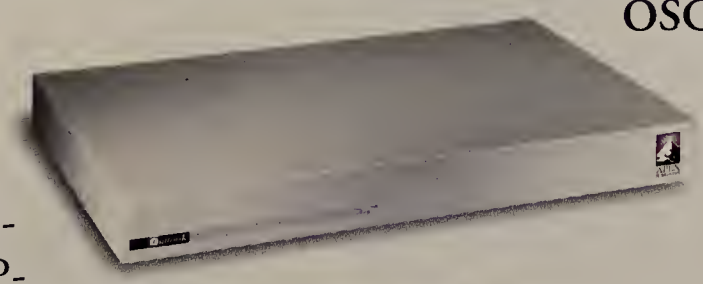

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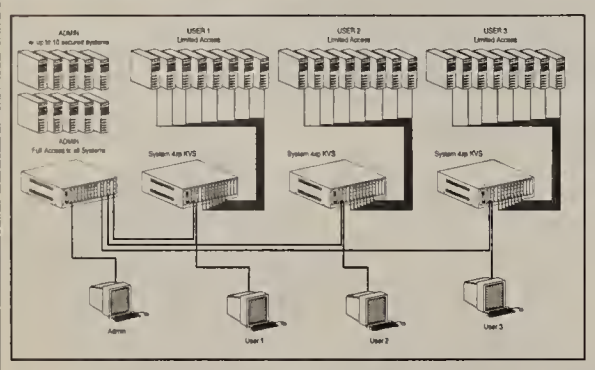

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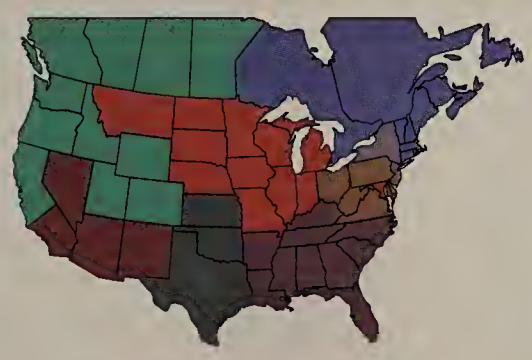

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Hydra

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deployment.

Microsoft plans an elaborate Hydra debut next week at Comdex in Las Vegas. A Hydra Pavilion will showcase Hydra server-based software running a range of Windows office and business applications.

The Hydra software will add multiuser capability to Windows NT 4.0. Hydra is based on software licensed from Citrix Systems, Inc., of Fort Lauderdale, Fla. Citrix created its own multiuser NT server, called WinFrame, based on NT 3.51. Citrix is developing the Hydra server for Microsoft.

HYDRA'S COMING OUT PARTY

What to expect at Comdex next week:

- Microsoft's Hydra Pavilion will showcase the server-based multiuser NT software performance as well as third-party administration tools.
- The first public test of Microsoft's T.Share communications protocol for linking terminals with a Hydra server.
- A range of new Windows desktop terminals, priced from $500 to $700, that feature different amounts of memory, levels of screen resolution, monitor sizes and management features.

Customers will be able to set up a Hydra server and use it to run 32-bit Microsoft applications. End users then can access the applications via low-cost Windows terminals instead of full-blown Windows PCs.

Hydra is widely seen as Microsoft's attempt to combat the potential appeal of Java-based network computers by offering a low-cost desktop that is more easily managed and maintained than Windows PCs.

Early evaluators said Hydra has very basic features compared with what is available in WinFrame. The evaluators also said Microsoft's T.Share protocol, which links the desktops with the server, at this stage is slower than Citrix's Independent Computing Architechture (ICA) protocol.

Citrix WinFrame, and presumably Hydra, both have several characteristics that could pose problems for customers considering large-scale, thin-client deployments. WinFrame needs a lot of CPU poer, memory and disk space. Some applications might require changes to run on the server, and WinFrame does not fully support multimedia applications. In addition, WinFrame can make heavy bandwidth demands on WAN connections.

WinFrame requires a major investment in server resources, according to George Morris, technology planner with Bell Mobility, a wireless services provider in Toronto. Bell Mobility has about 120 WinFrame servers in production and about 1,500 users connected to them. "Yes, it's resource intensive, but the prices of those resources have been dropping like a stone," Morris said.

Bell Mobility uses Citrix software to cluster fairly cheap, lightweight, dual-processor servers. No more than 12 users are on each server, minimizing the effects of a server failure.

This clustering feature will initially be missing from Hydra. "Hydra is a pretty basic product," said one user who evaluated the early code.

Adding weight to Hydra

To flesh out Hydra, users will have to rely on Citrix's Picasso software, which is now in development. Picasso will run on the Hydra server and will add features such as ICA client support, encryption, clustering and load balancing.

Both Morris and Citrix's Chairman and founder Ed Iacobucci acknowledged some applications might need changes at the source-code level to run on WinFrame and Hydra. But Iacobucci said such changes are rare. And even if they are needed, they may be simple to do, according to Morris. It all depends on the application.

If applications are doing heavy-duty number crunching, they can slow server performance, Iacobucci said. "But typically these applications are running on bigger server systems and their power mitigates this effect," he said.

Citrix recommends an average of 20K bit/sec of network bandwidth per WinFrame session. On a low-bandwidth WAN link, which still is typical for many corporate networks, a few users could saturate the link. But so would almost any traditional client/server application, said Citrix officials.

Also at Comdex, Windows terminal vendors will showcase their wares. Some will be running early versions of the client operating systems based on Windows CE 2.0. Neoware, of King of Prussia, Pa., will unveil two NeoStation 200 terminals, both with a Motorola PowerPC processor, 1024-by-768 resolution and a PCMIA slot. Pricing has not been finalized.

Tektronix, of Beaverton, Ore., also will announce a Windows terminal, with the same resolution. It is priced at $1,195 and includes a 15-inch color monitor. ■

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Cabletron

Continued from page 1

modem, frame relay, X.25 and leased-line access directly into one or more of MMAC-Plus' 14 slots. This will enable companies to centrally control WAN and LAN connections via Cabletron's Spectrum Enterprise Manager and SecureFast policy-based management offerings.

Currently, customers need to install separate remote access devices from Cabletron and other companies to tie remote end users and branch offices into networks anchored by MMAC-Plus switches.

"The potential primary benefit is to reduce the amount of network administration time," said MMAC-Plus user Roland Voyages, who is director of technical services at NationsBanc Montgomery Securities, Inc., based in New York.

The two- and four-port modules, which are scheduled to ship in January, will provide Layer 2 and multiprotocol Layer 3 switching in addition to remote access. They will come mostly preconfigured, so the customer will only need to enter IP addresses, said Brian Barton, remote access program manager at Cabletron.

As a bonus, Cabletron will bundle its SecureFast VLAN Manager software at no extra cost. SecureFast employs an autolearning feature that can automatically reconfigure a replacement board, making the modules hot swappable.

In addition, the modules will support standard security technologies such as CHAP, RADIUS and TACACS.

Last year, Cabletron announced plans for a similar module, code-named Willow, which was the result of the company's acquisition of ISDN provider Network Express, Inc. and frame relay vendor Netlink, Inc. (*NW*, Oct. 14, 1996, page 6). The 9W006 and 9W007 modules essentially are the first shipping versions of Willow, Barton said. Willow, which originally was slated to ship in the second quarter this year, predated 56K bit/sec modems and initially was intended to support ISDN only.

Cabletron's *new remote access modules are slated for the MMAC-Plus, which will centralize control of dial-up connections.*

The 9W006 and 9W007 are for use outside the U.S. and each comes in three models. The 9W006-200 supports two ISDN Primary Rate Interface (PRI)/T-1 lines, the 9W006-400 supports four ISDN PRI/T-1 lines, and the 9W006-220 supports any combination of two ISDN PRI/T-1 lines and 48 56K bit/sec digital modems. Each PRI supports 23 data channels and one signaling channel and, when run over a T-1 line, supports 24 64K bit/sec channels.

Barton predicts the 9W006-220 will be the top-selling model because of its ability to autodetect an ISDN or modem connection.

Customer evaluations

But some customers will not go with the 220, because 56K bit/sec modem access is too slow. NationsBanc Montgomery Securities, for instance, only is looking at the ISDN options.

"We're evaluating [the modules] for use when we rebuild our trading facility in the first quarter of next year," Voyages said, noting that the company has not yet used any of the modules.

NationsBanc Montgomery Securities has three MMAC-Plus chassis in its headquarters, with six more scattered throughout the organization.

The company has about 1,800 employees. About 25% of them have remote access requirements, Voyages said.

Since currently the only way to bring remote access users into Cabletron networks is via stand-alone remote access devices, such as Cabletron's SyberSwitches, customers have been left on their own to cobble together viable solutions.

"You name it, we use it," Voyages said. Mostly, his company employs Shiva Corp.'s LanRovers and Cisco Systems, Inc. stand-alone access devices.

Such an ad hoc approach is likely to be the case for most of the MMAC-Plus customer base, which Cabletron estimates to be 20,000 units worldwide. And managers are likely to look at the new modules as Voyages does.

"I have too much of an investment in the older technology to do a forklift upgrade," he said.

And the upgrade will not come cheap. The suggested retail price ranges from $16,995 for the low-end 9W006-200 to $39,995 for the 9W006-220.

The products will not be for everybody, one analyst said.

"It plays to a certain class of customer who is looking to have what I call a Swiss Army knife-type of solution," said Craig Johnson, principal analyst for the Network Infrastructure Service at Current Analysis, Inc., of Sterling, Va.

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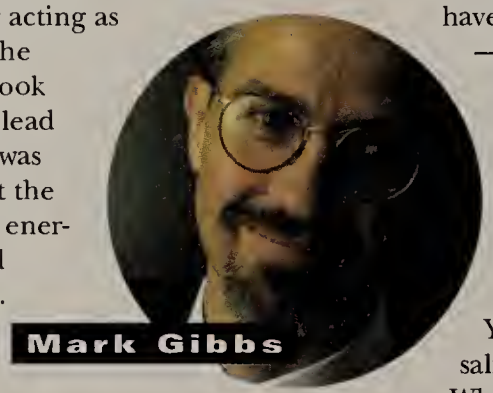
Backspin

Running interference: Avoiding crazy machines

I seem to be developing a write-only memory. Perhaps it's just that I'm heading rapidly toward 45 and the brain cells are failing. Or maybe it's a product of the information overload I've written and talked about so much. Needless to say, I much prefer the latter explanation.

However, I do remember some years ago reading a science fiction story by Robert Heinlein entitled *Waldo and Magic, Inc.* (Thanks to Amazon.com for acting as my memory on the author.) In this book our hero wore a lead coat because he was concerned about the amount of radio energy being beamed around on earth.



Mark Gibbs

At the time, I thought it was a nice touch but unlikely to be a big problem. So it was with some surprise that I read the following from the *Sydney Morning Herald,* which was posted to the Information Warfare Web site at www.infowar.com:

"Crazy cars: The newest hazard on Sydney's roads" by Phil Scott

New cars are jamming their own brakes, locking doors, shifting gears and mysteriously shutting down. The cause: electromagnetic interference, the same phenomenon that affects hospital equipment and aircraft instruments.

At risk are a small number of new cars with inadequate "immunity" built into the electronic systems which control engines, brakes, transmissions and features such as central door-locking, cruise control and air-conditioning. Some airbags may even be prone to random firing, claim the experts.

Engineers list known Sydney hot spots as near the airport on General Holmes Drive, in parts of Chatswood and Hurst-ville. Traffic light sensors, taxi and police radios, broadcast transmitters and underground power lines can trigger failures.

So, Mr. Heinlein was right. Radio noise and induced current are royally screwing up modern electronics. And the situation can only get worse as microprocessors show up in everything from toasters to refrigerators.

Now, if your microprocessor-controlled toaster — which can dynamically adjust for humidity and bread quality to ensure a repeatable, consumer-satisfying, thermally modified, baked-goods-consumption experience — ejects the bread after only 37 seconds because of interference, no big deal other than an irritated consumer with lousy toast.

But if the toaster should interpret the interference as instructions to cook the bread for 27 minutes at maximum temperature, we could have a wholly different result — smoke, sprinklers, property damage, fire, etc. Or how about your refrigerator deciding that the ideal temperature for raw meat is 62 degrees Fahrenheit from 10 a.m. to 2 p.m.? You'd have E. Coli and salmonella for dinner.

What happens when intelligent elevators decide to stay in the basement at the start of rush hour or cars, buses and trains randomly stop when they shouldn't? These kinds of events will make the stress from information overload seem trivial. We'll have people going "postal" at the drop of a hat.

Here at the Gibbs Institute we've come up with an answer for this radio saturated future: shielding. The simplest and most effective solution is for any device that might be affected to have a layer of half-inch thick lead built-in by the manufacturer, along with an earthing strap that should be attached to ground the device whenever it is in use.

We realize that the added weight will be a hard sell for what used to be ultraportable electronics such as radios, tape players, telephones and laptop computers, but we believe the government should sponsor a get fit campaign to back up the plan. Then we'll have a reliably computerized and fit society.

There's a lot more detail to our plan but unfortunately at the moment I can't quite remember where I put it.

Send your interference to nwcolumn@gibbs.com or beam it into (800) 622-1108, Ext. 7504.

'NET BUZZ

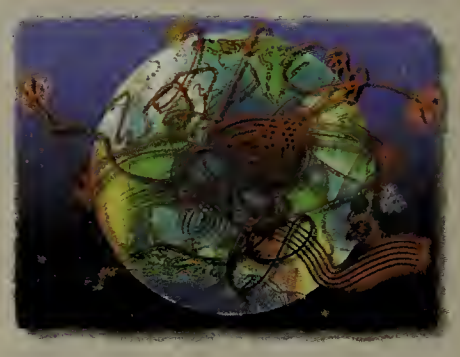
The latest on the Internet/intranet industry

By Chris Nerney

A LOT OF BROWSER, A LOT OF CUSTOMERS Quite a number of people who downloaded **Microsoft's** Internet Explorer 4.0 shortly after it was released Sept. 30 complained about the browser's long download time.

Turns out it wasn't just their imaginations or, as we suspected of a few, their usual, tiresome whining.

Keynote Systems, Inc., of San Mateo, Calif., which offers software and services for measuring Web site and Web application responsiveness from a user perspective, reports that Internet performance did indeed deteriorate dramatically, and apparently alliteratively, during the week Internet Explorer 4.0 was released.



Here's why: During the first two days of availability, more than one million users downloaded the long-anticipated and much-hyped browser. According to Keynote, if each of these users downloaded the full 25M-byte package, those downloads would have eaten up the equivalent of 770 T-1 lines or 26 T-3 lines for two full days.

While we understand Internet Explorer 4.0 is free, this is the kind of market response that makes us understand why **Bill Gates** is richer than **God.**

Of course, even in heaven they sometimes cut corners. For example, many people find the popular **Microsoft Network Web site** (www.msn.com) to be rather slow. Keynote has a good explanation for that too.

The MSN site uses eight servers, but instead of running Microsoft's current Web server software, Version 3.0, the servers run the ancient and much slower Version 1.0.

That's right: God is serving us the bar whiskey.

MAKING BRIGHT TIGER JUST A LITTLE BRIGHTER Web site software start-up **Bright Tiger Technologies,** of Acton, Mass., today will annnounce a $6 million venture capital deal with three investors.

It is Bright Tiger's second round of financing. The company acquired $4.4 million in capital in January.

Original investors **Accel Partners** and **North Bridge Venture Partners** were joined in the new round by **Oak Investment Partners.**

Bright Tiger last month released its first product for building and managing Web sites. The software, ClusterCATS, is based on intelligent server clusters.

ONDISPLAY GRABS $6.7 MILLION INVESTMENT Internet middleware start-up **OnDisplay, Inc.,** of San Ramon, Calif., has received $6.7 million in second-round venture funding from a group of investors.

Norwest Venture Capital kicked in $4 million of the total, with first-round investors **Atlas Ventures** and **Matrix Partners** funding the balance.

OnDisplay, founded in 1996 by former **Sybase** employees, is best known for its CenterStage software, which enables businesses to extract and process data from HTML documents on the World Wide Web.

AN OFFER YOU CAN'T REFUSE And for you job seekers, Internet software start-up **Quintessential Objects, Inc.** (QOI) of New York has posted an enticing opportunity for jobseekers on its Web site, www.qoi.com.

On the FAQ section of the site, in response to a question about whether the company is hiring, QOI replies, "Currently, we are only interested in highly skilled, creative, fun individuals *who will work as hard as we do for free*" (their italics).

Damn, their enthusiasm is infectious. Throw in some pretend stock options, and you've got a deal.

We also work (almost) for free. Our payment is the hot Internet- and intranet-related news that you send our way, which raises a lot of resentful questions among our immediate family. Still, it's all we've got, so contact Chris Nerney at (508) 820-7451 or cnerney@nww.com.

Directed and presented by Tom Jenkins, TeleChoice, Inc.

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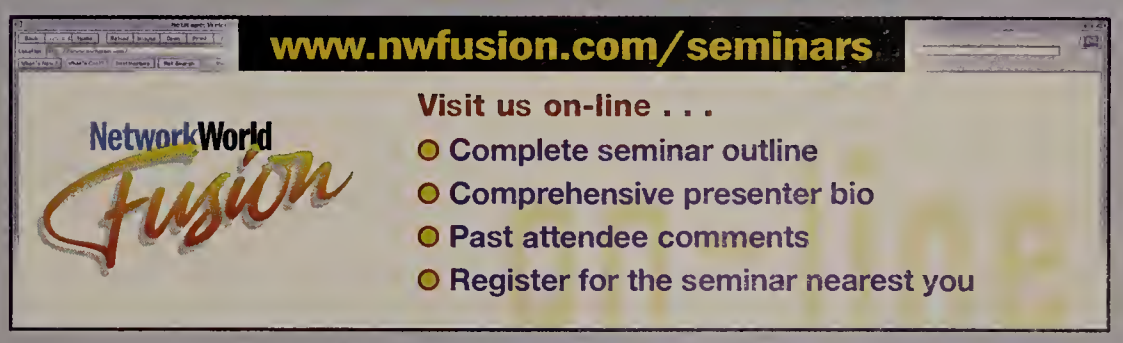

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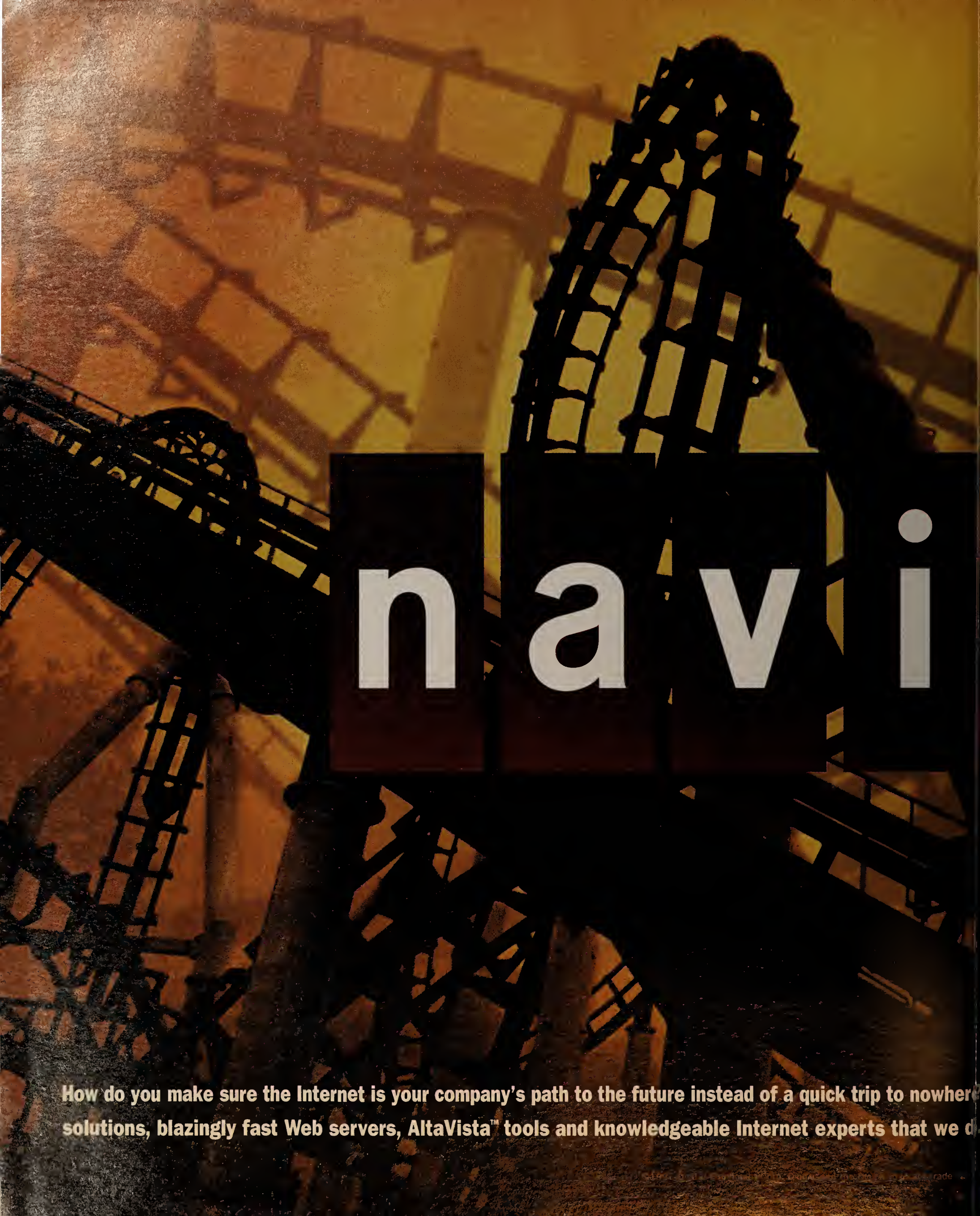

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